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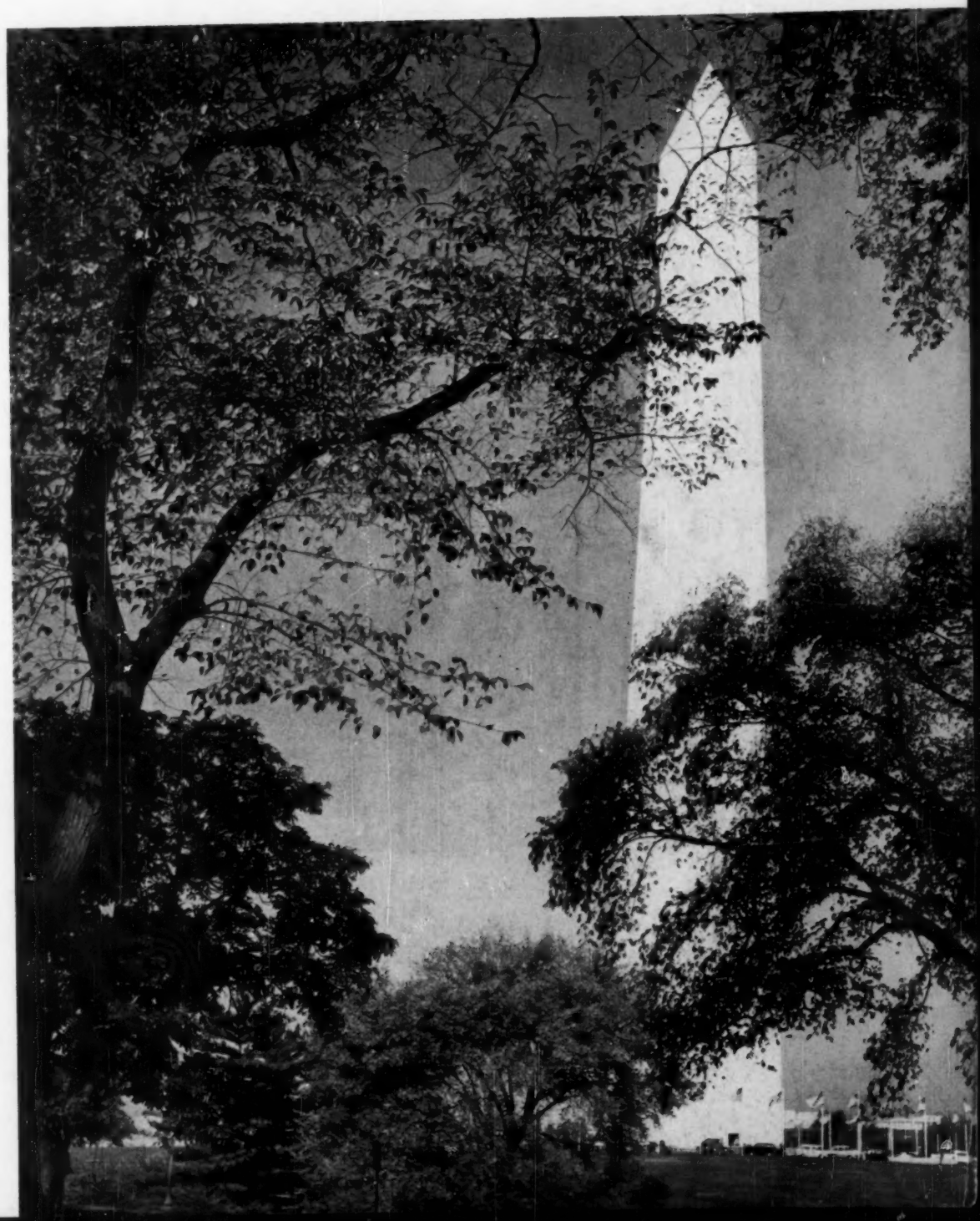

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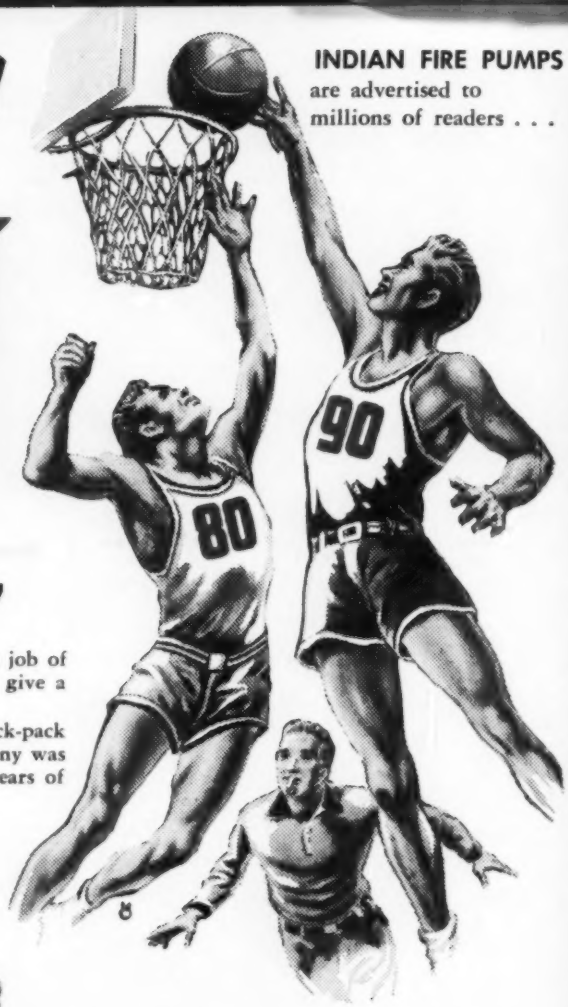

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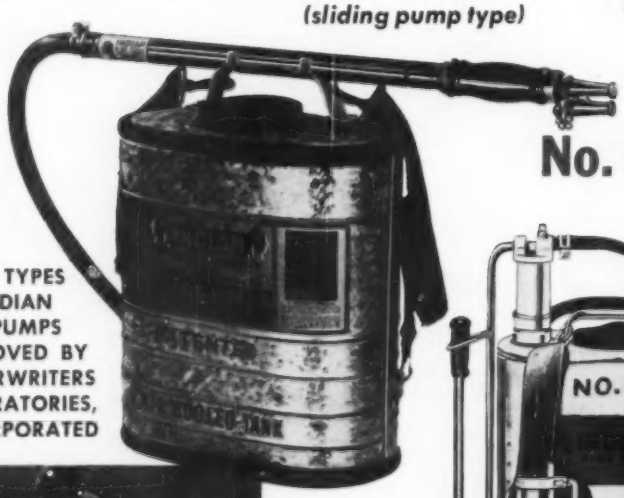

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Forested Municipal Watersheds in the Northeast

Howard W. Lull

FORESTED municipal watersheds and forest-bounded reservoirs provide and protect water supplies for 339 municipalities in the Northeast. These areas vary in size from a few acres of planted conifers screening a reservoir to the more than 86,000-acre area managed by the Metropolitan District Commission of Boston. Most of these areas are public lands, either municipally owned or reserved from state and federal ownerships for municipal water supply. Private water companies own large holdings in Pennsylvania, Connecticut, and Massachusetts.

Regardless of ownership, the principal function of these lands is to provide high-quality water for domestic use or to protect the shorelines of impounding reservoirs. To find out the extent of these areas and their locations, the Northeastern Forest Experiment Station recently canvassed public health services and state forestry offices in the 12 states in its region.

Results of this survey by states are shown in Table 1. Of the 339 watershed-reservoir forests, 303 were in five states: Pennsylvania had the highest number, 98; and Connecticut, New Hampshire, Massachusetts, and New York possessed 58 to 48 watershed areas each.

In Pennsylvania, about half of the acreage in watershed forests is state-owned land that furnishes water for 35 cities and towns. About one-third of the area is owned by water companies; the Scranton Gas and Water Company and the Springbrook Water Company manage the largest area, approximately 53,000 acres. Lewisburg and Lewistown depend on the largest acreage of state lands, between 20,000 and 25,000 acres each.

In Massachusetts, over half of the municipal-watershed acreage is in the Quabbin Reservoir property of 86,392 acres, which provides water for the Boston metropolitan area. Springfield has a watershed forest of slightly more than 12,000 acres; and North Adams, Westfield, and Worcester have 6,000 to 7,000 acres each.

Most of the New Hampshire acreage is in the White Mountain National Forest, which furnishes water supplies to 29 municipalities or water-using organizations. Aside from these areas, New Hampshire's largest municipal watershed is owned by Manchester—5,200 acres—followed by Gorham with 4,700 acres.

TABLE 1.—NUMBER AND AREA OF MUNICIPAL WATERSHEDS AND RESERVOIR FORESTS

State	Watershed-reservoir forests	
	No.	*Acres*
Connecticut	58	104,982
Delaware	1	280
Maine	6	2,402
Maryland	8	48,861
Massachusetts	48	145,025
New Hampshire	54	130,294
New Jersey	8	53,210
New York	48	44,085
Pennsylvania	98	306,786
Vermont	10	8,600
Total	339	844,525

In Connecticut, 41 of the 58 watersheds are owned by water companies. The New Haven Water Company has the largest area, 21,000 acres, followed by Bridgeport Hydraulic Company with 17,000 acres. Hartford ranks first in municipal-owned lands with 20,000 acres; New Britain and Waterbury each has approximately 5,000 acres.

New York State's municipal-owned watersheds are small, averaging something less than one-half the size of those in the four states summarized above. The estimate in Table 1, however, may be low. No exact list was available, but as New York has the largest number of community forests of any state, 672, it is likely that a good proportion of these could be classified as watershed-reservoir forests. The acreage in Table 1 includes 10,531 acres for New York City and 4,000 to 5,000 acres each at Little Falls, Glens Falls, and Rochester. In addition, New York City draws water from about 200,000 acres of the Catskill Forest Preserve (and from an additional 500,000 acres of nonpublic watershed land), and there is an unknown acreage of watershed land in the Adirondack Forest Preserve that supplies water to 20 municipalities.

The New Jersey area consists largely of the 36,000-acre Pequannock Watershed owned by Newark. Atlantic City has an area of more than 5,000 acres. The Maryland acreage includes the 18,000 acres of forest-reservoir properties owned by Baltimore; the Savage River

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State Forest of 17,000 acres, which provides domestic and industrial water for three communities; and the 8,000-acre watershed of Frederick.

Vermont's 8,600 acres include the 4,000-acre area of Rutland and the 1,000-acre areas of Essex Junction and Montpelier. Rhode Island's acreage consists largely of the 11,000-acre reservoir property of Providence. Five of the six watershed areas in Maine range from 75 to 250 acres in size; Portland has the largest, approximately 1,600 acres. Delaware's only entry is the 280-acre reservoir property of the Wilmington Water Department.

If to this table were added an estimated 25 municipalities that obtain water supplies from an estimated 300,000 acres of National Forest watersheds in Vermont, Pennsylvania, and West Virginia, and the acreage comprising the source of New York City's water, the totals would be more than 360 municipalities and well over 1,000,000 acres of forest land. A rough check of the population served by these municipal watersheds indicated that it includes about one-third of the region's population.

Protection Forests

According to Kittredge (*8*), acquisition of municipal forests for the protection of watersheds was authorized by Massachusetts in 1882. Many watershed forests were established from 1900 to 1920, the era when many community forests were created. During much of this period watershed sanitation consisted of natural purification by long storage (*3*). With extensive use of chlorination, beginning around 1915, land acquisition was thought less necessary. But, as road systems and automobiles made water sources and reservoirs accessible, the protective function of the forest has achieved new importance.

Nowadays, high-quality raw water is sought so that chlorination and other treatments may become additional factors of safety instead of the entire solution. Riehl (*10*) compares this situation to changing views on milk sanitation. After pasteurization proved effective, very little attention was paid to sanitary conditions under which raw milk was produced, for almost any milk could be made safe. Today, the situation has channged; sanitary conditions at the dairy farms are carefully controlled and pasteurization has become only an additional factor of safety.

Increasing emphasis on securing high-quality raw water also stems from growing knowledge of viruses that can contaminate supplies. In recent years, according to LaDue (*9*), more than 60 distinct disease-associated viruses, excreted through the human alimentary tract, may have been identified. It is highly possible there are no adequate methods for their control or removal from raw-water supply.

The ultimate in water protection for a municipality would be complete ownership of a forested watershed as the source of water supply, a forest-protected reservoir providing long storage, and purification treatment as required and necessary. This combination is rarely realized. Most large cities rely on varying degrees of forest protection and storage, with treatment and tests for purification the final step before delivery to consumers. New York City, for instance, relies on forest-protected watersheds and reservoirs (city-owned areas and the Catskill Forest Preserve), and long storage before the water is purified, and also obtains water from largely forested watersheds in the upper Delaware with no ownership control. Baltimore, on the other hand, with no watershed property, gets protection from the city-owned forested shorelines around three large reservoirs, long storage, and purification.

Over 30 years ago, W. W. Ashe (*2*) suggested that at the then low market price for forest land, municipalities would do well to purchase suitable watersheds as an investment. This situation has changed. Currently, Hopkins (*6*) points out that watershed ownership is not economically practical; rather than buy an entire watershed, it would be better to buy strips of land, at least 100 feet wide, around reservoirs. Ownership of these strips, under the eastern doctrine of riparian rights, gives absolute jurisdiction over the shores of the reservoirs.

This ownership right gives the municipality control over recreation, thus setting up a situation that currently is provoking much debate. On one side are burgeoning numbers of vacationists and sportsmen seeking water recreation; on the other side are water authorities keenly aware of their responsibility to deliver pure water. This controversy is likely to continue. Water authorities will undoubtedly seek to restrict recreation areas on the valid argument that production of pure water is paramount over any other use. At the same time, continued pressure of recreationists may lead to some relaxation of restrictions; considering this pressure, more rigid restrictions will not likely be forthcoming.

The expressed policy of the American Water Works Association on recreational use of reservoirs and adjacent lands sets high standards of protection and emphasizes the responsibilty of the waterworks management (*1*). According to this policy, no recreational activity should be permitted on reservoirs that deliver water ready for consumption, on reservoirs that provide end storage prior to treatment, and on upstream reservoirs containing high-quality water that can be distributed to consumers with disinfection only. On upstream reservoirs requiring treatment additional to disinfection, recreational activities are considered permissible under appropriate sanitary regulations, ". . . determination of the kind and extent of recreational use should be the sole responsibility of the water works executive of the system involved whose primary obligation is to provide a safe and potable water . . ."

Forest Management

For many years, management of the watershed-reservoir forests consisted only of fire protection, fence-

ing and patrolling to prevent trespass, and planting open areas. With this care, the forests grew in volume and value. By the 1930's plantations were producing salable products, second-growth forested watersheds had been inventoried, and management plans were common. One of the best known of these managed areas, the Eli Whitney Forest belonging to the Water Company of New Haven, Conn., was for many years under the profitable management of Professor R. C. Hawley of the Yale School of Forestry.

More recently, the Bureau of Water Supply of Baltimore, Md., has set up management of their 18,000 acres of reservoir property under the direction of Superintendent Louis Ningard with a management program based on multiple-use and due recognition of watershed-protection standards. Walter C. Sushko, a professional forester, supervises timber cutting and reforestation of open lands. Present cutting is an improvement operation aimed at removal of overmature and defective and undesirable trees; generally a minimum reserve of 3,000 board-feet per acre is left.

Among other foresters of the Northeast who are managing watershed lands are Irving A. Hart, who handles 20,000 acres of woodland properties for the metropolitan district of Hartford, Conn.; John M. Heilman, who directs the forest operation on the 36,000-acre Pequannock watershed of Newark, N. J.; and James F. Heagy, who directs the management of municipal watersheds operated by the American Water Works Service Company, Inc., of Philadelphia. Other managed watershed properties include those of Manchester, N. H., Glens Falls, N. Y., and Little Falls, N.Y. These are but a few of the many watershed-reservoir forests under forest management.

Reforestation has been a major project on many of the watersheds that contained open lands. Westfield, Mass., has watershed plantations that were established in 1909, and Rutland, Vt., has had an extensive reforestation program dating from 1917. Providence, R. I., has planted 6,800,000 trees in the past 25 years; Rochester and Glens Falls, N. Y., have each planted more than 2,000,000 trees on their watersheds. Baltimore, Md., has planted more than 2,300,000 trees adjacent to its reservoirs.

Much of the reforestation has been to create shoreline forests around storage reservoirs. As a general and accepted practice, conifers have been planted to keep hardwood leaves from falling into and discoloring the water. This practice also reduces taste and odor problems and helps prevent clogging of intake structures by accumulation of leaves in the fall of the year (*4*).

Shoreline plantations also serve as windbreaks to lessen wind action. According to Ashe (*2*), during winter and spring months particularly, wave action from the wind not only reduces the rate of sedimentation but also brings about additional turbidity of the water from the scouring of the thin coating of silt and clay previously deposited. During winter and spring months, when temperature of the water is about the same throughout, constant wind action from any one direction, though light, may cause a complete overturning of the water in the reservoir.

Forest Water Supplies

With growing interest in the water resources and their growing value, there is an increasing appreciation that municipal watersheds are primarily water-producing areas and that wood production is a secondary function. John M. Heilman, forester on Newark's Pequannock watershed, has expressed this thought as follow (*5*):

> The main objective of our watershed management is the production of potable, palatable water requiring a minimum of treatment. Newark's location near New York City and the quality of Newark's water are the basic factors that have influenced industry to locate there. As of 1956 the taxes on the 36,000 acres of watershed land amounted to $159,000, or about $4.41 per acre, and no doubt will be higher this year. The township containing our largest holdings is charging us an average of more than $6 per acre per year to hold this land. Because of the character of the soil and topography, forest growth can never cover the tax except on a very few areas which might be, but are not now, intensively managed. Maximum hardwood growth of 200 board feet per acre per year has a stumpage value of about $6; average annual runoff in gross water value is worth over ten times this return. Thus, while the city employes a forester, his primary concern is not necessarily the production of wood products but the production of better and possibly more water.

Increasing emphasis on the water-supplying function of forest watersheds raises the question as to the forest area required to supply metropolitan areas with high-quality water. New York City can be used as an example. With a population of close to 8 million living in an area of 315 square miles, its population density per square mile is about 25,000, almost 40 people per acre. With a per capita water use of 150 gallons per day, 40 people will use the equivalent of 80 acre-inches of water per year, or roughly, the runoff from four forested acres. Four forested acres for each New York City acre would be equivalent to 800,000 acres. Actually, the City has about 700,000 acres of watershed land outside of the Delaware Basin, and an almost equal amount in the Delaware Basin. Part of the runoff from this latter area is used to maintain summer flow in the Delaware, and 29 percent of the runoff is diverted for municipal supply by the city (*1*).

If demographers with their thought-provoking forecasts are correct, the coming megapolis to run unbroken from Washington, D. C., to Bangor, Maine, will depend on a good proportion of the Northeastern forest area for high-quality domestic water. By then, perhaps, we will have the knowledge to permit management of water yield through forest treatment. Already, two municipalities, Baltimore, Md., and Newark, N. J., have set up cooperative watershed-research projects with the Northeastern Forest Experiment Station to determine the effects of their management on water yield and distribution.

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Property Taxes and Alternatives for Michigan[1]

Lee M. James

THE GENERAL property tax, which is limited mainly to real property, has long been considered a major problem by those concerned with forestry. For generations, thoughtful citizens have felt that there was something about the property tax which was particularly burdensome to forest landowners, with harmful effect both on forest landowners and the general public. The historical record provides ample basis for the concern about forest taxation in Michigan.

During the peak era of timber depletion in Michigan's great pine forests (1860 to 1890), local governmental services were developed to provide for the population which had associated itself with the lumbering economy. Often these governmental costs exceeded actual need because the development of a sound and flourishing agricultural economy was expected to follow logging. Such development did not always materialize, but once services were launched, it seemed politically and administratively difficult to reduce them. While governmental needs for revenue remained uniform or expanded, the tax base from which revenue could be extracted shrank as logging progressed. To counteract this shrinkage, tax rates were steadily increased. For example, average forest property taxes per acre increased in Michigan from 24 cents in 1900 to $1.02 in 1924 (*4*).

The burden of the property tax played some role in the excessive liquidation of Michigan's old-growth forests. Perhaps taxes were not the dominant influence, but they were a contributing influence. The Forest Taxation Inquiry concluded that interest on invested capital, in general, greatly overshadowed taxes as a carrying charge, but the fear that earnings could not keep pace with all carrying charges led to excessive liquidation of timber (*4*).

Where the annual property tax has proved most burdensome is in its application to cutover lands. Through the "cut-out-and-get-out" era of logging, landowners were often unwilling to pay high annual taxes on lands that would not yield additional income in the foreseeable future. Millions of acres of cut-over lands were forfeited for non-payment of taxes. Eventually, much of this land came into state and federal ownership (*7*).

Land forfeiture for nonpayment of taxes, which was high even before the turn of the century, continued to increase parallel with the increases in tax rates. The culmination was reached about 1933 when a constitutional amendment in Michigan limited property tax rates to 1.5 percent of assessed valuation. This was not an absolute limitation, but its immediate effect was to produce a large reduction in rural property taxes (*7*). Other sources of tax revenue gained prominence. More than 80 percent of Michigan's local and state revenues was derived from property taxes in 1900, but only about 40 percent was derived from the same sources in 1935. Since 1935 the percentage has remained near the lower level (*12*).

Influence of Recent Property Taxes

It is not likely that recent property taxes have had much influence on forestry practices. A study

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[1]Paper presented at winter meeting of Wisconsin-Michigan Section, Society of American Foresters, Lansing, Mich., March 13, 1959.

conducted in the northern half of the Lower Peninsula in 1954 and 1955 shows the most common tax bracket for forest properties is 10 to 14 cents per acre, and 89 percent of the private forest is taxed at less than 25 cents per acre (*7*). The weighted average of 18 cents per acre is a far cry from the $1.06 per acre average determined for the same region by the Forest Taxation Inquiry in 1925.

In appraising the management influence of the forest tax structure, it must be recognized that, to an ever-increasing degree, values other than timber production are shouldering much of the burden of taxes and other costs of ownership. Nineteen percent of the private forest in northern Michigan (held by 39 percent of the owners) has recreation or residence as the primary objective of ownership. An additional 18 percent of the forest is held for investment or speculation, primarily in anticipation of future recreational values. On these properties, on the 31 percent of the forest which is held in conjunction with farms, and on the 19 percent held for watershed and other non-timber objectives, timber production is often a secondary purpose of ownership (*7*). Timber production is not expected to pay for all the costs of ownership.

We have no way of knowing, at this point, how much tax burden on private forests can be absorbed by purposes other than timber production. At some point, which will vary with individuals, the costs of ownership will become excessively burdensome, even where ownership has multiple purposes. At this point, owners will lose their incentive to manage timberlands constructively. At some further point, they will lose interest in continued ownership.

As foresters, our main concern is commonly with the impact of taxes on the substantial blocks of land where ownership is interested mainly in producing timber. On these properties, the property tax becomes burdensome at a lower point than it does on multiple-purpose properties. Money costs must be weighed against money returns on timber properties, and if there is no return for management there is no incentive to management. Perhaps we need not yet be concerned with the possibility of taxes becoming so burdensome that many owners will lose interest in continued ownership, but we do need to be concerned that taxes do not take away from the landowners the incentive to undertake planting and the care of immature and mature timber needed to achieve productive forests.

Inequities in Forest Property Taxes

Many kinds of property owners find fault with the application of the property tax system, but forest landowners have more basis for complaint than most groups of property owners.

One fundamental grievance is a time bias inherent in the property tax system. The property tax requires annual payments on the assessed value of real property, but annual income from which to pay annual taxes on forest properties often is not available. The usual pattern in forest income is extremely variable, large in some years, small or entirely lacking in other years.

In all years when income is deferred, the forest owner must borrow money to pay taxes, or if he uses his own funds, he has to forego the earning power of that money put to some alternative use. Whether he borrows or not, the owner of a deferred-yield forest faces an interest cost on his taxes which accumulates at a compound rate until income becomes available to pay off the successive tax bills. There is no escape from this time bias where annual taxes are called for, unless a forest is on a sustained-yield basis producing income in all years from which property taxes can be paid.

Ignoring the bias built into deferred yields for the moment, there remains a considerable problem of gaining equitable assessment of forest properties in relation to each other and to other properties.

Assessment is usually supposed to reflect sale value, but sale value in forest properties is nebulous. The best guide to sale value is actual recent sales in the locality of comparable properties where both buyers and sellers are willing and informed of the values at stake. These conditions are hard to meet, particularly since comparability among forest properties is difficult to establish.

Most assessors fall back on a kind of rough judgment whose basis is extremely uncertain. What else can we expect? Few of them have the time, the facilities, or the technical competence to properly establish forest values.

Even where technical competence exists, it is difficult to obtain fair treatment of forest properties. Consider, for example, the *Assessor's Manual,* 1955, the guide to assessors prepared by the Michigan State Tax Commission (*13*). This is one of the better state assessment manuals, but in its treatment of forest properties, it illustrates the difficulty of obtaining equitable tax treatment.

Like most assessment manuals, the Michigan manual refers to two elements in forest value: (a) land and (b) timber. Land value, when we are referring to forest production, is based on future timber yields discounted to the present. Thus, adding land value to timber value results in double counting—timber as productive capital is included in both the land and the timber values calculated. The common concept of the assessment guides arises from the old notion of the forest as a mine—a liquidation value in the timber and a residual land value after the timber has been cleared. But under our present concepts, land value deserves separate recognition only when it is cleared. With trees growing, the productivity of a forest depends on a composite of land plus timber capital and the two have to be considered jointly. As a matter of fact, a tract covered with inferior growth might be worth far less than it would be cleared and ready for planting.

Not only is there an objection to adding land value to timber value because of possible double counting, but one might object even more strenuously to the system of assessing timber on the basis of its liquidation value. The timber may have the value at which it is assessed provided it can all be immediately converted into products at prevailing market prices, and the land may have the value ascribed to it if it could be sold gradually over a period of years. But neither land nor timber has these values when they are held and managed together for the production of a regular income derived from timber crops (*10*). To assess on the basis of liquidation value may result in actually encouraging liquidation, which is hardly a proper goal of public policy. Sustained yield is what public policy ought to be and what it usually aims for —except in the field of property taxes.

To encourage sustained yield, assessments should consider forest properties as sustained-yield enterprises. That is, the valuation of a property should be based as closely as possible on its sustained earning capacity. But frequently a calculation based on supposed liquidation value far exceeds value based on sustained earning power. For example, I have just examined some published inventory data for the jack pine type in the North Tip Block of the Lower Peninsula (*16*). Average volume is about 7.2 cords per acre. At $3.50 per cord, this would mean, under ordinary property tax procedure, an average value of $25.20 per acre plus an estimate of land value which might average about $8 per acre. The total value indicated would thus be about $33 per acre. Average growth, however, would indicate a sustained gross income of about $0.98 per acre. This is gross yield, not net. But even on this exaggerated basis of income calculation, capitalizing at 5 percent would indicate a value of $19.60 per acre, and at 6 percent, $16.33 per acre.

Even if we should be willing to overlook the unsoundness of the usual method of tax assessment—i.e., placing a cash value on the land and adding to it a liquidation value for the growing stock—evidence of overassessment is not hard to find. Using its own methods of determining "true" cash value, the Michigan State Tax Commission found the ratio of assessed value to true value in 6 Upper Peninsula counties to be slightly higher for forest properties (68 percent) than for other rural properties (64 percent); and in 8 Lower Peninsula counties, the ratios average about 81 percent for forest properties as compared to 45 percent for other rural properties (*14*). The latter figures check with inequities in assessment discovered in other states where rural and forest assessments have been studied (*1, 17*).

Acceptance of Inequities in Forest Property Taxes

If forest assessments are out of line with other property assessments, the question may well be asked why complaint from forest landowners has not been more vigorous. The answer undoubtedly has many parts: (a) For the typical small landowner, there is not much difference in total cost between a low per acre tax and a high one. (b) For the farmer, the tax on the woodland is a small part of the total farm tax and, in most cases, the woodland tax is not even distinguishable on the bill. (c) For the small absentee owner, his diversified interests and other sources of income combine to help take the sting out of the forest tax bill. (d) Because the tax bill on forest holdings often appears low, many landowners are not aware of the fact that their properties are generally overassessed in relation to other properties. (e) Inertia also plays a part in the lack of complaint.

Most forest landowners may not have been greatly upset by their tax bills in recent years, but there are two qualifications that deserve emphasis: (a) Industrial and other large landowners concerned with profitable timber-growing operations are more acutely aware than than the mass of landowners of inequities in forest taxation. Thirty cents per acre, for example, may not be much, but when spread over large holdings it can represent a highly significant tax bill, one that can greatly impair the profitability of tree-growing operations. (b) The second point is that the tax bill is moving up steadily. A recent tax study in 93 agricultural townships in Michigan, for example, shows property taxes nearly doubling between 1945 to 1955 even in terms of constant dollars (*6*). This trend is likely to continue, and it may accelerate.

The uncertainty about the future tax bill and its relation to earnings is a disturbing tax aspect of timber-growing ventures. The investor in a timber-growing enterprise needs a taxing method which will equitably relate his tax to the worth of his property as an income-producing enterprise and give him some assurance of the maintenance of an equitable relationship into the future.

Forest Yield Taxes

A forest yield tax has been suggested and tried in many states as a substitute measure for the general property tax on forest properties. Its basic principle is the postponement of all taxes on growing timber until the timber is harvested. This postponement applies only to timber, since the land remains subject to an annual property tax. When timber is harvested, the amount of the yield tax is determined either by the amount or the value of the timber cut.

Fourteen states now have forest yield tax laws. In all of them, except in Mississippi, New Hampshire, and Louisiana, the laws are optional.

Woodlot yield tax.—Michigan's first efforts to provide a forest yield tax were directed toward farm forestry. The Foster Act of 1911 attracted only a single listing before it was replaced by the Woodlot Act of 1917 (Act 86, P.A. 1917). The Woodlot Act remains in force as an optional alternative to the general property tax.

Under the terms of the Woodlot

Act, woodlands are assessed at not more than $1 per acre. The regular annual ad valorem general property tax rate applies to the assessed valuation. When the timber is harvested a yield tax is imposed at the rate of 5 percent of the stumpage value of the timber cut. Firewood or building material for domestic use is exempt from the yield tax.

To qualify for classification the land listed must be not over one-fourth of a tract, not over 160 acres in size, of which at least half is improved and devoted to agriculture. Stocking of trees must attain specified standards; if not attained naturally, trees must be planted. Under the law, no woodland pasturing is permitted.

Application for listing must be made with the county treasurer who, in turn, notifies the local supervisor or other assessing officer. Before making a commercial harvest the landowner must notify the assessor and, after cutting, the owner must file a record of the volume and value of the timber cut. The timber cannot be removed until the yield tax is paid.

Because no central agency has effective responsibility for administering the Woodlot Act, no agency attempts to compile statewide statistics on classification under the Act.

The first study of the operation of the Act was undertaken in 1925 (*3*). At that time, 1,580 acres of woodland held by 55 owners were listed. By 1939, the total crept up to 2,538 acres in 72 holdings (*15*). This represented an insignificant fraction of Michigan's 3.8 million acres of farm woods recorded by the census in that year.

Since the Forest Service study of 1939, no attempt to compile statistics on forest land classified under the Woodlot Act has been made. However, from inquiries at the extension forester's and state forester's offices, it is clear that farmer interest in the Act has remained mild and additional listings have never comprised a substantial acreage.

Commercial Forest Reserve (Pearson) Act.—Michigan's forest yield-tax law dealing with commercial forest lands, commonly referred to as the Pearson Act, dates back to 1925 (Act 94, P.A. 1925). Listing forest lands under the provisions of this act, as in the case of the Woodlot Act, is optional with forest landowners.

Under the present terms of the Pearson Act, forest land may be withdrawn from the ad valorem tax rolls. The landowner is required to pay an annual property tax of 5 to 10 cents per acre. The State of Michigan contributes an additional 15 cents per acre per year to the local government, making a total fixed payment to the local government of 20 to 25 cents per acre. When timber is cut, it is subject to a yield tax of 10 percent of its stumpage value. Half of the yield tax collected is retained by the state and half goes back to the counties for distribution to the local units of government.

The Pearson Act is aimed specifically at commercial forest properties. To qualify for listing, no portion of a property may be used for agricultural, mineral, grazing, industrial, recreational or resort purposes. The land has to be capable of growing commercial timber, but it must not be overstocked with mature timber at the time of application. Tree stocking must be sufficient to show promise of developing a commercial stand at maturity. No restriction of public hunting or fishing on the property is permitted.

Certification of an application for listing is the responsibility of the Department of Conservation. Before cutting any timber on a listed property, the landowner must obtain a permit from the department. After cutting, the owner must file a record of the volume and value of the timber cut. The department verifies the report, then collects the yield tax due.

Listings in Michigan under the Pearson Act rose steadily from 24,000 acres in 1926 to 145,000 acres in 1954, then jumped to 425,000 acres at the beginning of 1958. The present listing still represents a small part of the total forest land eligible, but the recent upsurge in interest is noteworthy.

Most of the listed areas are parts of a few large corporate holdings in a few counties of the Upper Peninsula. In the Lower Peninsula, where large corporate holdings are scarce, few forest areas have been listed under the Pearson Act. As a matter of fact, in most years, withdrawals have exceeded new listings, and the acreage has declined from the initial listing of 8,500 acres in 1926 to 4,970 acres in 1958.

Appraisal of Forest Yield Taxes

The Pearson Act is being used much more extensively than the Woodlot Act in Michigan, but we cannot say that either of these optional laws has been highly successful. Our experience parallels that in other states where optional laws are in effect. In his 1952 study of "Forest Yield Taxes," Ralph Marquis noted that the total forest classified under the optional yield-tax laws of 12 states was just over 3 million acres, a mere 2.6 percent of the total commercial private forest land in these states (*9*).

Marquis summarized the many reasons for the relatively small acreage entered by private landowners under optional yield-tax laws. Briefly, these explanations may be listed as follows: (a) lack of knowledge by landowners about the existence of the law and its specific provisions; (b) administrative restraints including cumbersome methods of application, inspection, and certification; (c) fear that classification will subject the owner to harsh restrictions on the manner in which he treats his land and timber; (d) lack of sympathy or outright opposition to the law by public officials; (e) eligibility requirements which may eliminate many forest holdings on the basis of size or other criteria; (f) absence of any tax advantage on many properties through shifting from property tax to yield tax; and (g) lack of concern about the property tax because it does not weigh heavily upon individual landowners, because income is generally high, and because property taxes can be used as legitimate deductions in income tax returns (*9*).

Any appraisal of yield taxes must distinguish between the operation of laws in effect and yield taxes as a concept which could be applied in a manner to eliminate some of the current problems in application.

Many of the factors which tend to restrict acreage entered under yield-tax laws could be eliminated by shifting from an optional law to a mandatory one. As long as yield-tax laws are optional, their use will be restricted by lack of knowledge about these laws, by administrative restraints, by opposition from local officials, by fear of public controls over management, and by restrictive eligibility requirements. Moreover, optional laws look like a public subsidy. Many landowners feel obliged to avoid an optional tax law because it might be construed by others as avoidance of a fair share of property taxes in a locality. The only way this individual onus can be avoided is to have a mandatory law.

Some landowners are content to have optional yield-tax law on the statute books simply as a means of holding property tax assessments within bounds. The feeling here is that tax assessors will hesitate to raise forest property taxes beyond a certain point because of the existence of the yield-tax alternative. If the property tax becomes sufficiently burdensome, the landowner may shift to the yield tax.

This is an advantage to forest landowners, but it can easily be overstated. If property taxes rise to the point where the optional yield tax appears to provide substantially less tax revenue, then then there will be pressure to change the yield-tax law. We have had some experience with this situation in Michigan. Whereas the Pearson Act previously required the landowner to pay an annual land tax of 5 cents per acre, the law was amended last year to provide for larger payments up to 10 cents per acre in townships where millage rates had increased to 20 mills or more. The amendment is in the nature of a compromise arrangement between local officials and commercial forest landowners. We cannot suppose that the situation has been frozen. If property taxes continue to rise, there will be further pressure to increase annual fixed payments under the yield-tax law.

This brings us to a major problem in appraising our yield-tax laws. What determines the total amount of tax the law is intended to produce? Is the yield tax intended to provide a subsidy to forest landowners, to equal the amounts that would be paid under the property tax, or to exceed the alternative property-tax payments? Or is some other objective intended? In the case of the Woodlot Act, it appears that a subsidy to farmers was intended as well as aid through the timing of tax payments. In the case of the Pearson Act, particularly in view of the recent amendments, it was probably intended that tax payments should at least equal the amounts that would be paid under the property tax.

In looking at yield taxes, interested landowners have tended to contrast their comparative tax burdens under the existing property tax and the alternative yield tax available to them. One or the other tax might appear more advantageous to the landowner depending on a number of variables (*6*). Such comparisons for relative advantage are understandable and desirable from the landowner's viewpoint, but the more significant question is: Are the provisions of the existing law equitable? How do the total tax payments under the yield tax add up and compare with worth based on earnings

The portion of the yield tax which is an annual land tax is designed to provide local governments with some current revenues which are reasonably certain and uniform from year to year. It also gives the owner greater certainty about his future tax costs. But unless this portion of the tax is small in relation to the total, it introduces an element of cost which may have no apparent relationship to earnings.

The yield tax on timber harvests, on the other hand, is geared to gross income. In its usual form, as a percentage of the value of harvests, it is the fairest approach yet devised to taxing timber properties. On deferred-yield forests, where no income is forthcoming, the tax is deferred until such time as income is forthcoming. As harvests are increased, and hence, the gross yield of the forest, the yield tax is increased proportionally. As stumpage values rise, and hence, the gross income of the forest, the yield-tax also rises proportionally.

This might seem to be the ideal method of taxing forest properties, if any method of taxing can be called ideal. However, from the taxing unit's viewpoint, the indefiniteness of the yield tax is a great drawback. Local government needs stable, predictable revenues. For its purpose, the most desirable portion of the yield tax is the annual tax on land. Thus the yield tax which evolves is a compromise arrangement between a stable tax on land and a variable tax on timber. If the tax on land is a large portion of the total tax, government's purposes may be met but the forest owner is confronted with the defect of time bias in deferred-yield forests and loses the advantage of linking his tax to income. If the tax on timber is the big portion of the total tax, then the total tax will tend to be related to income, but government officials will be inclined to object.

One is forced to conclude that any form of yield tax will fail to fully reconcile divergent aims. The tax cannot be completely satisfactory to both landowners and governmental units. But unless a yield-tax law can be worked out within a state to reflect mainly a tax on timber yields, it loses its chief advantage for forest landowners, since this is the portion of the tax which is related to earnings and which corrects for time bias in deferred-yield forests. Moreover, the tax must be equitable in relation to taxes on other forms of property. It should be set up on the basis of capturing a portion of earnings which is in line with

the proportion of earnings taken from other forms of property.

In this connection, we should be willing to take a long, hard look at the taxes levied by our yield-tax laws. Farm real estate taxes in the United States rose from 3 percent of net farm income in 1946 to 7 percent in 1956; the increase in Michigan was from 3 percent to 8 percent (*6*). Such increases have been a matter of concern to farmers, but consider how well off forest landowners would be with a tax taking only 8 percent of net earnings.

For simplicity in application, yield taxes have been geared to gross stumpage income rather than net income. This is a sensible procedure, but if a tax of 8 percent of net earnings is intended, it would probably be no more than 5 percent of gross earnings. The Pearson Act, however, levies a tax of 10 percent of the forest landowner's gross earnings plus a fixed annual charge of 5 to 10 cents per acre. The fixed annual charge, itself, may easily amount to 10 percent of gross earnings. In relation to earnings, it is apparent that the forest landowner is being taxed more than twice as heavily as the farm property owner.

In my own appraisal of forest tax problems and needs, a yield tax, equitably adjusted to earnings, is superior to the general property tax. This is not to say that the advantages are all on one side of the ledger. Advantages and disadvantages can be listed under either tax plan. Any comparison within a state has to consider the conditions of the property tax—how equitably it is applied among forest properties and between forests and other forms of property, and the severity of the problem of deferred yields. If assessments appear to be applied equitably and if forests approach a sustained-yield condition, then there may be no need to supplant or modify the property tax. However, in the usual situations, deferred-yield forests are common and property taxes do not reflect the earning capacities of forests. Under either or both of these situations, a modification of the property tax may be desirable, and the most generally acceptable plan that has been advanced thus far is a form of the yield tax.

New Approaches in Forest Property Taxes

If the decision is to remain within the framework of the property tax, then we should concentrate on plans that will reasonably link the annual tax to earnings. Two approaches deserve careful consideration. One is being tried in the state of Maine; the second, in Minnesota.

Maine's new tax law, which became effective in 1953, deserves examination both for its simplicity and its recognition of earning power (*5*). The sections of the Act in which the amending legislation is incorporated, read as follows:

"*Policy.* It is hereby declared to be the public policy of the state, by which all officials of the state and of its municipal subdivisions are to be guided in the performance of their official duties, to encourage by the maintenance of adequate incentive the operation of all forest lands on a sustained yield basis by their owners, and to establish and maintain uniformity in methods of assessment for purposes of taxation according to the productivity of the land, giving due weight in the determination of assessed value to location and public facilities as factors contributing to advantage in operation.

"*Assessment.* An assessment of forest land for purposes of taxation shall be held to be in excess of just value by any court of competent jurisdiction, upon proof by the owner that the tax burden imposed by the assessment creates an incentive to abandon the land, or to strip the land, or otherwise to operate contrary to the public policy herein declared. In proof of his contention the owner shall show that by reason of the burden of the tax he is unable by efficient operation of the forest land on a sustained yield basis to obtain an adequate annual net return commensurate with the risk involved."

Local tax assessors will be in compliance with the new law only when they base their assessment on the productivity of the land in question rather than, as heretofore, on the value of the standing timber as it may happen to have on it at the time. The law presupposes a fair relationship between the tax and the net return received from the operation of the property on a sustained-yield basis.

Only time will tell how good this law is in operation. But at least it points in the right direction for a property tax on forests. The big drawback, as I see it, is the burden it places on both assessor and landowner to determine what is an equitable tax. If the landowner thinks the tax prevents him from obtaining a fair return on his investment, he must be able to prove his contention in court.

The other property tax modification I should like to call attention to is that contained in the new Minnesota Tree Growth Law (*8*). This law, passed in 1957, deserves especially careful study as a possible modification of the property tax on forests. It has the weakness of being an optional law. As a general property tax, it does not meet the problem of time bias in annual taxing of deferred-yield forests, but it does come to grips with other aspects of achieving equitable taxation.

The essence of the law is that the annual tax would take a portion of the annual value growth in timber. Computations are to be made on a county basis following a procedure prescribed in the law. Average volume growth in each forest type in a county is to be multiplied by average stumpage values as reflected in recent sales. Value growth for a property would be based on acreage within each of the forest types present, and the tax would be computed at 30 percent of the total value growth.

This law does not recognize differences among properties in their yields. The tax is based on average conditions, which means that poorer forests will be relatively overtaxed, and better forests, undertaxed. This could be viewed, in part at least, as a means of re-

warding management efforts which lead to better-than-average growth rates. There is also a question about the pertinence of a tax which takes 30 percent of the gross yield. Further study is probably needed to determine what percentage of gross yield will provide an equitable tax in comparison with taxes on other property. The chances are that 30 percent is too high, although for many landowners it will probably mean a lower cost than is sustained under the general property tax.

Nevertheless, despite possible objections, the Tree Growth Law will offer landowners a more equitable basis for taxes than they can obtain under the usual assessment procedures of the general property tax. It assures landowners that taxes will take only a portion of the gross value increment of forests. It also assures local governmental units a more dependable source of revenue than is provided by yield tax formulae.

The percentage of yield that can justifiably be taken by property taxes in Michigan also requires some study. We can remind ourselves, however, that farmers in Michigan are currently taxed 8 percent of their net earnings. If forest landowners were to give up the same percentage of gross earnings, rather than net, they would be theoretically overtaxed, but it would be a profitable exchange for their present property taxes. The gross stumpage yield of Michigan farm woods amounts to about $0.65 per acre annually (*18*). This may be more than the yield for all forests, yet 8 percent of this figure comes out to 5 cents an acre. This is so far below the actual tax levels that none of us can hope to persuade assessors or tax commissions to reduce forest taxes to such an extent. However, if we can gain the application of even partial comparability with other forms of property, the prospects for forestry might become much brighter.

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Forestry's Space-Age Future—Flying or Falling?[1]

George A. Craig

ATTEMPTS to predict forestry's future have primarily relied on estimates of such factors as the capacity of our forests to grow wood and the needs of consumers for wood products. Not enough attention has been given to that essential element—the industry that converts the raw material into consumer goods. The character of our industry will have a big influence on how much wood we will grow, how much we use, and the form in which it will be used.

Agreement on Short-term Outlook

There has been general agreement among forest economists that in broad outline the pattern for the next 15 years includes a continuing decline in the per capita consumption of wood but an increase in the total demand for wood products.

As to be expected, there is more uncertainty about the prospects for wood in the distant future. There will be strong forces at work to reduce our capacity to produce wood, while the need for wood products should continue to increase.

Factors affecting the supply of and demand for wood are many, obviously. They have been discussed in detail by governmental and other reports. Of major interest has been the Forest Service 1958 report *Timber Resources for America's Future*. After noting trends in population and gross national product, as well as the importance of timber in the national economy, Edward C. Crafts (*34*) states in the summary of the report:

> The outlook for forestry in a national setting as just described could hardly be other than favorable. There have been relatively high prices, strong demand, and no general depression in recent years. Forestry is being practiced on both private and public lands at an accelerated rate. It is increasingly recognized that growing timber is economically profitable under certain conditions, particularly where forest industries have substantial timber and financial resources.

Please note that this is a generally optimistic but qualified statement. There is reason to believe that the qualifications might have been greater if there had been more consideration of the financial position of the industry.

Estimates Can Be Sharpened

Of course, no matter how well estimates of future developments are prepared, they always may be refined by analyzing the development of basic factors in subsequent years. Some of these developments are encouraging; others are not.

The Forest Service report noted that by the time it was being published the basic estimates of population trends were too low (*34*). Recent estimates of population growth are even greater. Instead of a total of 215 million people in 1975, qualified people believe the U. S. will have 235 million (*25*).

The other key indicator of the demand trend — the "gross national product"—can also be expected to be higher than anticipated. In spite of our recent recession, the current level of our total output for all goods and services in constant dollars is nearly 16 percent ahead of the 1952 level (*40*), slightly above the estimate.

Forestry Programs Are Accelerating

There is considerable evidence that we are progressing more rapidly in forestry programs than was anticipated by the authors of *Timber Resources for America's Future*. The Forest Service itself may soon be financed to administer the harvest of nearly 85 percent of the present allowable cut from the national forests. There is strong Congressional interest in providing the roads and other factors necessary to reach the full allowable cut level.

Timber operators' annual deposits for timber-stand-improvement work on national forests under the Knutsen-Vandenberg Act are at the highest level ever. The Forest Service has more than $11 million on deposit and another $9.3 million was obligated in fiscal year 1958 (*35*).

State forestry programs are expanding. Between 1945 and 1957, the forest acreage that received protection from fire under state programs was increased by 32 percent and the expenditures for this work were quadrupled. Additional area needing protection has been reduced to less than 10 percent of the total (*36, 22*).

Private forestry efforts have shown great growth. A striking example has been the planting program. The Forest Service report predicted that planting may increase to a "maximum annual rate of more than 800 thousand acres" during the period 1965-1974 (*34*). The Forest Service's annual planting reports show that in 1957 planting had already increased to a rate of more than one million

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acres per year. The fiscal 1958 report lists more than 1½ million acres planted, 88 percent of which were privately owned (*37*).

Little noticed has been the Forest Service report that natural seeding also is making a net annual reduction of 312,000 acres in the area needing planting (*34*). The forest—our wood production plant—is growing in capacity.

Problems to Come to Forest Lands

Strong indications of future problems in forest-land use are with us now. Some of these have been anticipated, but the speed of their development would have been difficult to foresee.

Of course, reservoirs and roads have been and are expected to continue to be consumers of forest lands and reducers of wood production. However, recreation probably will have a greater impact and more quickly than expected. Cutting budgets have been revised downward for much of the national forest areas to satisfy recreationists. There are strong pressures for more "wilderness"—recreational areas without roads or timber operations. Resistance is great to the building of roads into under-developed areas, even when careful studies have shown the areas to be best suited for timber production and family-camp-type recreation. The wilderness proponents are even opposed to cutting heavily infested stands in areas designated for multiple use by the Forest Service (*24, 10*). Certainly the demand for mountain cabin sites will continue to grow and to reduce the productive forest area.

I feel that it is especially unfortunate that there is not wider understanding of the fine job southern California foresters are doing in improving forest recreational areas through logging (*11, 21*).

Other problems will include more taxes and the increasingly difficult problem of protection of the forest from fire. Great progress has been made there, but the costs are mounting.

Intensity of Forestry Depends on Stumpage Price

How much protection, stand improvement and restocking our forests receive depend on the price of stumpage in the long run. Stumpage prices rose sharply following World War II. In fiscal year 1956 national forest stumpage price averaged 245 percent of the 1947-1949 average (*38*). As a consequence we have had justification for the increased expenditures by private and public agencies for more intensive forestry programs.

What will stumpage prices do in the future? The Forest Service's just-released "Program for the National Forests" indicates that in 10 to 15 years that agency expects to be selling timber at prices about 38 percent above present levels (*32*).

What Determines Stumpage Price?

This is a most interesting assumption. For one reason, the Forest Service intimates that America's demand for wood in 1975 will be met with no increase in the price of forest products (*34*). There is of course a relationship between the product and stumpage price. Perhaps we should briefly review what determines stumpage price.

In an analysis of timber pricing made for the Forest Service last year, Professor Sidney Weintraub (*43*) pointed out that stumpage demand is a derived demand. It is derived from the demand for the wood products it supplies. The Forest Service's appraisal manual recognizes stumpage price as a residual value—that which is left after operating costs and a reasonable allowance for profit and risk have been subtracted from the selling price of the manufactured product (*39*).

Thus, the intensity of our forestry practice will depend on what is paid for wood products, how much they cost to produce and the amount of profit realized by manufacturers.

Lumber has been and is expected to be the principal consumer of industrial wood for many years. In the 1950's it has amounted to about twice the volume of pulpwood produced (*34*), and the value of wood used for lumber has been considerably greater on a per unit basis than pulpwood. Therefore the outlook for lumber is particularly significant to forestry.

Lumber Prices Have Been Too High

In 1953, Stanford Research Institute estimated that if the price of lumber kept climbing, as it had compared to competing materials in the prior 14 years, it would price itself out of most all of its markets within 25 years. Viewing the long-term trend early in 1957, A. Kenneth Beggs, SRI senior economist (*4*), reported:

> Based on the way in which lumber prices have kept on with their very steep climb, not only is lumber well on the way to keeping our prediction of pricing itself out of many of its markets, but it is also helping to cut down on the level of new residential construction by its effect on total construction costs.

In the past 2½ years lumber prices dropped sharply, and at the same time many mills went out of production. Richard May of the California (now Pacific Southwest) Forest and Range Experiment Station, for example, reported that in the spring of 1958 there were one-fifth fewer sawmills in operation in California than in the previous year (*15*). Twenty-three of the mills out of production had capacities of more than 10 million feet per year.

Since the low point in lumber price, about a year ago, there has been some recovery. However, the Western Pine Association price index for ponderosa pine for March of this year is only at the July 1957 level, which was lower than it was at any time since the summer of 1950.

The effect of inflation on these lower prices is interesting to consider. The Bureau of Labor Statistics preliminary wholesale price index for all commodities other

than farm products and foods in February, 1959, was at 127.7 percent of the 1947-1949 level. Wood's competitors, "nonmetallic minerals-structural" and "metals and metal products," were at 137.5 and 153.4 respectively (*30*). Lumber and wood products were at 122.1.

In a paper published in *The Timberman*, Professor John Zivnuska, University of California (*46*), recently said:

> The preliminary estimates indicate that lumber production in 1958 was at its lowest level since 1949 and about 10 percent under 1952. Moreover, lumber prices in constant dollars averaged about 8 percent lower in 1958 than in 1952, while the prices of a number of competing materials were higher. Less lumber was sold at lower prices in a larger economy with a higher rate of housing starts and greater construction activity in general.

On this evidence, there is little reason to expect a sustained improvement in both production and the real price of lumber compared to the prices of its competitors.

Costs Continue to Rise

Although lumber prices are well above the level of 20 years ago, so are costs. Obviously, most of the mills that went out of production recently did so because their costs would not permit them to produce lumber for sale at current prices. Some, who continued to produce lumber, did so at a loss, anticipating a pickup in the market and recognizing that their fixed costs would cause even greater loss if they shut down.

Various studies indicate that the rising cost of lumber production is a long-term trend (*42, 44*). This is particularly understandable to us in the West, where we see less accessible timber and trees of smaller size or greater defect being harvested and produced into lumber.

Lumber's Profit Experience Poor

The third factor affecting stumpage prices and forestry opportunities in the future will be the manufacturer's return for profit and risk on investment. The exact profit position of the industry is difficult to evaluate, as Professor Weintraub found in his study for the Forest Service. Weintraub did discuss at length the limitations of data on profits expressed as return on investments, and he suggested the use of profits to sales as a more realistic device (*43*). However, available data indicate that lumber's profit experience has been poor compared to that of its manufacturing competitors in the building supply field.

For example, information on income after taxes expressed as percent of net worth for leading manufacturing corporations, shows lumber to be the laggard in the past 10 years. Only once (1951) was it better off than all manufacturing. Cement, glass products, and other stone and clay products have shown themselves to be much stronger than lumber in this period (*17, 19*).

Average operating profit as a percent of sales value is reported by industries in the Economic Almanac (*17, 18*). The average for all manufacturing in 1952-1956 was 9.1 percent. For stone, clay and glass products the average was 14.8 percent; primary non-ferrous metals, 14.0 percent; chemicals and products, 13.5 percent; primary iron and steel, 12.2 percent; paper and products, 12.2 percent; and lumber and wood products, 6.8 percent. When we consider that lumber turns over its working capital at a slower rate than any of the other industries listed here (*8*), it is evident that the annual profit rate for lumber's competitors is about double that for lumber.

What Are Chances for Improvement?

With little room for a rise in lumber prices, with rising costs and with a poor profit position, we might expect difficulty in expanding the lumber industry production from the current level of about 34 billion to the volume of domestic lumber needed to supply the 1975 demand anticipated by the Forest Service (*34*). A review of other financial characteristics of the industry reinforces this apprehension.

In preparing comments on Professor Weintraub's analysis of the industry, I extended some comparisons he made and developed other data (*5*). This is what I found:

1. The growth for "All Industry" between 1950 and 1956 was 61.6 percent; for "Lumber and Wood Products," 18.8 percent (*27, 28*).

2. The increase in new capital outlay for "All Industries" between 1951 and 1956 was 49 percent; for "Lumber and Wood Products," 22 percent (*26, 28*).

3. Employment in the U. S. generally rose 10 percent between 1951 and 1956; for lumber, employment dropped 9.4 percent (*26, 28*).

4. Total wage and salary payments generally rose 37.7 percent between 1951 and 1956; for lumber, the total was up 13 percent (*26, 27*).

5. Dollar earnings in "All Corporate Manufacturing" between 1948 and 1954 dropped to 71.6 percent of the earlier level; for "Lumber and Wood Products," the drop was to 55.2 percent of the 1948 earnings (*18*).

6. Total capital invested in "All Corporate Manufacturing" rose between 1948 and 1954 by 49 percent; for "Lumber and Wood Products" the rise was 29 percent. However, in the last four years of that period, 1951-1954, total corporate manufacturing had a 15 percent increase while lumber and wood showed no rise (*18*).

7. Total assets for all corporate manufacturing increased 33 percent between 1951 and 1956; for lumber and wood products the increase was 8 percent (*18*).

8. The number of production and related workers in lumber and wood products dropped 11 percent from 1948 to 1956. From 1947 to the recession year of 1957, the drop was 22 percent (*31*).

9. Since 1951 lumber and wood corporations' total assets have amounted to less than 2 percent of

total assets for all manufacturing corporations, but lumber and wood products failures have accounted for 6.1 percent to 16.8 percent of the total current liabilities for mining and manufacturing failures between 1945 and 1956 (*18, 43*).

10. Lumber and wood had 401 business failures and $22.9 million liabilities reported in *Dun's Statistical Review* for 1956, lumber's worst year in the 11-year period covered (*43, 7*). The first nine months of 1958 included 397 more failures and $25.2 million in liabilities (*6*). The latter is at an annual rate of $33.6 million.

Thus we can see that on ten major points of comparison the lumber industry does not show promise of growth compared to industry in general. These data were the most recent available at the beginning of the year. I recognize that short-term data may not be representative of long-term trends and different base years could give different results, but the differences could be either way. On the basis of present evidence, the outlook for lumber is not promising in this early part of the space age.

Lumber's Dilemma Has Been Forestry's Boon

Generally speaking, relatively little investment has been required for the establishment of a small sawmill. Except for public timber, there has been no control of lumber's raw material over large areas. As a consequence, the postwar demand for lumber initiated the establishment of many small mills.

We have 46,000 mills, about 98.5 percent of which each produces less than 10 million feet per year. Collectively they yield 53 percent of our lumber (*14*).

Although the timber is in many ownerships it is not unlimited. Mills established with no assured supply of timber boomed stumpage rates out of sight in some areas. The cost of raw material is of course a part of the final product price. Lumber has a free market —supply and demand set prices —but the supply is limited by the cost of raw material and manufacture.

Many operations have failed, as noted earlier, but others took over in the drive to get high priced stumpage and convert it into lumber at a profit. The average *annual* business turnover for all industries—including manufacturing, retail trade, service, construction, mining, transportation, wholesale trade, finance, insurance and real estate—was 207 out of each 1,000 firms in 1949-1951. For all manufacturing, there were 221 discontinuances or transfers in ownership out of 1,000 firms operating at the beginning of the period. For "Lumber and lumber products" the annual turnover rate for the period was 363. Each year more than 36 percent of the firms went out of business or changed ownership. Only "eating and drinking places" and "filling stations" had worse records in the generally-less-stable retail groups (*33*).

This large unstable segment of the industry has had an important effect on forestry. It has given our product, unprocessed wood, a new economic status that has justified more intensive forestry practices. It has justified the development of less accessible areas. It has financed roads for forest protection and recreational use.

However, its consequences to forestry have not all been good. The instability of the market has made long-term decisions difficult for the more stable core of the industry. In addition, it has encouraged property tax assessors to increase their bite from the profit pie. This in turn will mean less incentive to practice forestry, particularly if stumpage prices do not maintain their gains. The resistance of the market to lumber prices indicates that stumpage may have its problems.

Lumber Still Is Most Important

Again, lumber's fortunes mean much to forestry's future. Certainly, without lumber we would require foresters. There are other wood products and other forest uses. Forest recreation and watershed management alone will require the skills of increasing numbers of trained foresters.

Plywood and pulpwood requirements are expanding rapidly, but our use of wood for lumber is still by far the most important factor in the forestry picture. Zivnuska's article in *The Timberman* pointed out that the decline in lumber and hardwood plywood (the latter because of imports) more than offsets expansion in pulpwood and softwood plywood. In the expanding economy of 1958, the board foot output of logs from our forests was at least 3 percent below the 1952 level (*46*).

Not only is lumber important because of its volume; its increased value is what has financed the development of the forest, as mentioned earlier. Pulpwood is a low value product that offers little justification for costly log-supply projects. Veneer logs are of higher value than the average sawlog, but the volume of logs going to this use is only about 10 percent of our consumption of live sawtimber (*23, 34*). We should also note lumber's importance to the families and communities of the three-quarters of a million people who produce and distribute lumber.

What's to Be Done?

Various solutions have been offered to meet lumber's problem. They range widely in value. The need to raise the productivity of the industry's labor is frequently mentioned with good reason. However, one of the least realistic suggestions has to do with measures to eliminate monoply in the industry.

The 1957 Statistical Abstract of the United States showed that 18 percent of the value of total shipments was accounted for by the 20 largest companies operating sawmills and planing mills. The comparable figure for steel works and rolling mills was 85 percent; for blast furnaces, 96 percent; for

aircraft, 96 percent; for tin products, 96 percent; for tires and tubes, 99+ percent, etc. (*29*).

In this comparison a "company" included all manufacturing establishments owned or acknowledged as controlled by the firm, including subsidiaries and affiliates. The numbers of such companies in the above examples ranged from 27 in tires and tubes to 109 in tin products. However, the number listed for sawmills and planing mills was 16,594.

Research and Product Development

Certainly on the plus side have been statements in favor of more research and product development. Our SAF president, Dean George Garratt, reported in the August 1958 JOURNAL OF FORESTRY that forest products research rose from 1.6 to 31 million dollars between 1926 and 1953, but the total 1953 disbursement was only 0.24 percent of the annual product value (*9*). The study which Dean Garratt quoted also showed that, exclusive of pulp and veneer products, "lumber and wood products" research was at 0.08 percent of products value (*13*). For all U. S. industries the average was 1.1 percent and some direct competitors of forest products spent as much as 5 percent.

Many examples of the value of such effort can be listed. Two California firms have found ways to increase the return from our former weed species—white fir. Ivory Pine Co. at Dinuba, Calif. profitably converts the bark to compost. General Box Distributors at Fresno, Calif. manufactures 2x16-foot or longer surface-smooth sheathing from shaky white fir lumber bonded between kraft paper. There is a strong demand for this product because of its highly desirable attribute of reducing the amount of labor required to put it into use.

Service to Customers to Be Better

Greater service to customers has obvious advantages where economical. One current move in this direction is the packaging of lumber. Small units are wrapped to prevent soiling or scuffing and to ease handling and inventory maintenance by the retailer. The packages can be made of trade-marked paper for promotion purposes.

The cut-to-length stud will have parallel developments in precut and prefinished panelling. One large firm is offering lumber made to order in exact sizes up to 24 feet long, 54 inches wide and four inches thick (*3*). Lumber siding is now available from sawmills with a water-repellent treatment that eases painting problems. It seems probable that the use of adhesives will be developed to simplify fastening problems for the lumber users.

Greater Trade Promotion

The need for more sales promotion was recognized in an organized way by the National Lumber Manufacturers Association recently. Under its leadership the industry has started a 1¼ million-dollar-per-year campaign to sell wood as opposed to other building materials. The association represents 40 percent of lumber production (*16*); one of the costs of leadership is carrying freeloaders.

The decision on promotion came after a research firm analyzed the industry's slipping market problem and reported the need for more sales promotion. It is the first industry-wide promotion effort since 1932 (*16*). Regional associations have promotion programs of their own as do some individual firms. Lumber and wood products advertising in the 1945-1954 period, expressed as a percentage of gross sales, was about one-third of that for all manufacturing industries (*41*).

Fiscal Policies Affect Housing

A recent survey of 400 lumber and wood products manufacturers disclosed the belief of lumbermen that "tight credit" was the economic factor likely to have the greatest effect on the lumber market during 1959 (*20*). The "tight money" policy of recent years has been credited by many lumbermen with causing some of their more recent marketing difficulties (*12*).

Other government actions will also have their effect on lumber and forestry. Examples are public housing legislation and the entrance of the Small Business Administration into the selling of public timber.

Public Timber Policy Improvement

With 48 percent of our commercial timber in public ownership (*34*), public timber policies will greatly affect forestry's future—directly and indirectly. The need for improvement on the national forests is recognized by the recent release of an outline of the administration's program for the national forests (*32*). However, it is far from complete or specific on some issues. This reinforces the opinion that an objective study of public timber policies and practices is needed to provide a sound foundation for policy development (*5*).

There can be no doubt that timber-policy improvements on the national forests can mean better utilization of the resource and greater public benefits; conversely, failure to improve can mean further damage to a weak industry and loss of public values.

Integrated Manufacture

Problems of increasing cost and incomplete utilization of our expensive raw material can be met by the integrated manufacture of other products with lumber. This was pointed out by John Zivnuska at the annual SAF meeting in 1955 (*45*). Much progress has been made in this direction, but the size of the problem can be visualized when we note that there are 45,000 to 50,000 sawmills in the U. S. and the 392 largest produce only 36 percent of our lumber (*1*).

Recent equipment developments have permitted mills operating on small logs to convert wood residues economically into bark-free chips that pulp plants use (*2*). In larger timber, some operators have made

the relatively larger investment in a debarker that will handle the large logs and the chipper that will produce pulpwood; some have combined veneer production with lumber production. Relatively few plants are equipped to produce more than one product in addition to lumber. These may make lumber, plywood and chips for particle board, paper pulp or fibreboard, as well as other products such as charcoal or chemicals.

Profits Not Prophets

After this review of our current problems and some of the factors that may bring relief, it should be noted that those requiring direct action by industry—research, promotion, service, integration—also require the expenditure of money, adding to present high costs. Without such expenditures it would appear that our forestry future could fizzle rather than boom with the exploding economy of the space age.

There are two possible sources of that money: the profits of the industry or investment capital. To justify the commitment of either, we must show the possibility of a greater return in forest products than that offered by other industries or by forest products in the recent past.

We have a wonderful renewable resource with great potential for continued service to man in the space age that is upon us. How much of that potential is realized depends on our abilities to produce forest products with a greater spread between total sales value and total cost. Even in the space age, there is truth in the saying that—"Profits not prophets foretell the future."

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Thinning Lodgepole Pine in the Central Rocky Mountains

Robert R. Alexander

LODGEPOLE PINE (*Pinus contorta* Dougl.) often reproduces overabundantly following clearcutting or fire. Intensive competition for growing space does not permit good development in such dense stands. Although shade-intolerant, lodgepole does not thin well naturally. Severe crowding of young trees of the same size leads to stagnation and retarded diameter and height growth. Even when crown classes are well differentiated, too many trees persist. Artificial thinning is needed under such conditions (Fig. 1).

Few recommendations are available for guidance in thinning lodgepole pine in Colorado and Wyoming. Studies reported in the literature leave little doubt that thinning immature lodgepole pine will increase the rate of diameter growth on remaining trees. Growth per acre frequently remains unchanged, but mortality is reduced and stand increment is concentrated on stems that will produce the final crop (*1, 2, 3, 4, 5*). However, utility of these results is limited because no attempt has been made to define thinning standards.

Studies were started between 1924 and 1934 to determine desirable levels of reserve stocking for lodgepole pine of precommercial size. Twenty-two plots were established on the Arapaho, Bighorn, Medicine Bow, and Shoshone National Forests in Colorado and Wyoming, under the direction of C. G. Bates and J. Roeser, Jr. The results of remeasurement in 1955 are summarized in this paper.

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Description of Study Areas

Study areas are typical of conditions under which second-growth lodgepole pine grows in northern Colorado and throughout Wyoming. Rounded hills, gentle-to-moderate slopes, and level benches at elevations of 8,000 to 9,000 feet are characteristic of the terrain. Soils are relatively shallow, well drained, sandy loams of granitic origin on the Arapaho, Bighorn, and Medicine Bow National Forests; and shallow, gravelly, glacial drift overlying a basaltic substratum on the Shoshone. Average annual precipitation is about 25 inches, two-thirds or more falling as snow between October 1 and May 30.

Stands selected for study were 35 to 78 years old at the time of treatment. The younger stands on the Medicine Bow were severely suppressed. All stands were overstocked and trees were below normal size and development.

Method of Investigation

Six blocks, with a total of 22 plots, ¼ to 1 acre each, were established to test different degrees of thinning. Four blocks contained four plots each; the remaining blocks each had three plots. One

FIG. 1.—Unthinned 38-year old stand of lodgepole pine on the Medicine Bow National Forest in 1933. There were 8,800 trees per acre with an average diameter of 1.7 inches. There has been little change in the appearance of this stand since 1933.

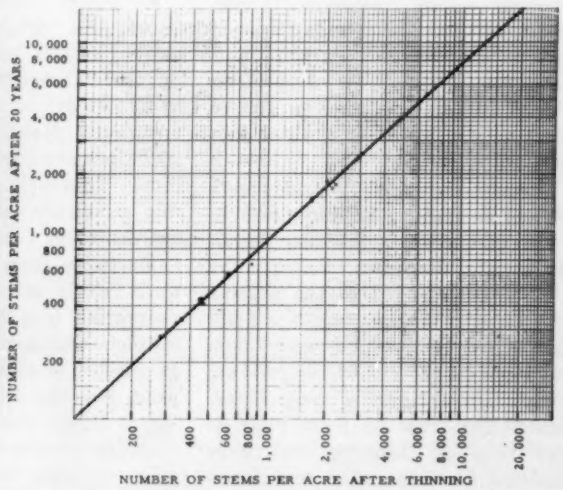

FIG. 2.—Number of stems surviving after 20 years at different stand densities.

TABLE 1.—LOCATION AND DESCRIPTION OF PLOTS BEFORE THINNING

Location	Date established	Average age when thinned	Plot size	Spacing	Entire stand before thinning per acre			
					Trees	Average Diameter	Average height	Basal area
		Years	*Acres*	*Feet*	*Number*	*Inches*	*Feet*	*Sq. ft.*
Meadow	1924	65	0.25	Unthinned	2,244	3.10	28.8	117.53
Creek	1924	65	0.25	5.2× 5.2	2,516	3.01	33.4	124.15
Arapaho	1924	65	0.25	8.4× 8.4	2,724	2.95	31.2	129.73
N.F.	1933	75	0.25	11.0×11.0	4,644	2.43	26.2	149.28
Clear Creek-	1928	35	0.33	Unthinned	5,334	1.56	14.0	71.32
Sourdough	1928	35	1.00	8.4× 8.4	4,918	1.73	14.6	80.29
Divide	1928	35	1.00	9.9× 9.9	5,004	1.66	13.1	75.48
Bighorn N.F.								
Long Creek	1934	78	0.23	Unthinned	2,234	3.70	—	166.08
Shoshone	1934	78	0.23	11.0×11.0	1,080	4.71	—	130.57
N.F.	1934	78	0.23	11.3×11.3	1,041	4.83	—	132.33
Chimney Park	1933	35	0.25	Unthinned	20,980	0.64	9.2	48.58
Medicine Bow	1933	35	0.25	5.0× 5.0	15,916	0.78	8.5	52.65
N.F.	1933	35	0.25	7.2× 7.2	12,548	0.81	9.6	45.30
	1933	35	0.25	9.7× 9.7	18,556	0.69	9.4	48.01
Chimney Park	1933	38	0.50	Unthinned	8,880	1.66	19.1	133.65
Medicine Bow	1933	38	0.50	7.4× 7.4	11,670	1.49	18.8	141.73
N.F.	1933	38	0.50	9.8× 9.8	9,410	1.79	22.8	162.10
	1933	38	0.50	12.5×12.5	6,902	1.97	23.1	146.02
Fox Park	1933	44	0.50	Unthinned	2,018	3.66	30.1	147.95
Medicine Bow	1933	44	0.50	9.9× 9.9	2,226	3.57	32.0	155.15
N.F.	1933	44	0.50	12.2×12.2	1,952	3.86	33.3	158.48
	1933	44	0.50	14.6×14.6	1,308	4.18	34.8	124.78

plot in each block was left unthinned as a control (Table 1).

Thinning treatments. — Treatments were uniform thinnings that left the best trees available at the desired spacing. The poorest dominant and codominant and most of the intermediate and overtopped trees were cut. Some of the better intermediates were frequently left to obtain the spacing desired. All quaking aspen (*Populus tremuloides* Michx.), Engelmann spruce (*Picea engelmanni* Parry), and subalpine fir (*Abies lasiocarpa* [Hook.] Nutt) were cut. There were only a few trees of those species on the plots.

Measurements. — Measurements before and after thinning and in 1955 were made to the same standards. The diameter of every live tree was measured to the nearest 0.1 inch at breast height. Total heights after thinning were taken on 10 to 20 percent of the residual trees. Crown classes were determined for trees on most plots at the time of thinning, but were omitted from the 1955 remeasurement because they appeared to be little affected by thinning. Basal areas were computed by 0.1-inch diameter classes for the entire stand of each plot. Increases in basal area are expressed as net mean annual increment per acre. No deductions were made for defect. Diameter growth is expressed as average annual increment per tree.

Results

Mortality.—Thinning, which reduced the original number of stems 75 to 97 percent, effectively reduced subsequent mortality. Ten to 50 percent of the trees died on unthinned plots; whereas only 3 to 23 percent died on the thinned plots. Losses in all stands were due primarily to suppression of smaller trees (Table 2).

Mortality from time of thinning until 1955, reduced by straight proportion to a 20-year period for all plots, increased with an increase in number of stems left after thinning, but was little influenced by age or initial size (Fig. 2). Figure 2 can be used to estimate mean 20-year mortality for different levels of growing stock.

Diameter growth.—Average annual diameter growth was increased by all thinning intensities tested. It was 20 to 405 percent greater in thinned than in unthinned stands. Subsequent diameter growth was greater for small than for large trees, and greater at the wider spacings (Table 2). According to the best of several multiple correlations that were tried, diameter after thinning and growing space accounted for 95 percent of the variation in mean diameters 20 years after thinning. The relation of mean diameters 20 years after thinning (Y) to mean diameters immediately after thinning (X_1) and growing space per tree immediately after thinning (X_2) can be expressed by the regression equation:

$$Y=1.4481+0.6743X_1+0.0146X_2. \quad (1)$$

Y and X_1 are expressed in inches and X_2 in square feet. The multiple correlation coefficient is 0.9732 and the standard error of estimate 0.393 inch.

The equation indicates that the diameter 20 years after thinning is related linearly to both diameter immediately after thinning and

growing space per tree. The greater the initial diameter, the greater the diameter 20 years later, and the greater the growing space, the greater the diameter 20 years later.

Thinning is usually done on a basis of spacing or number of trees per acre. Either of these can be substituted for growing space in equation (*1*). Growing space per tree is simply the square of the mean distance between trees. Therefore

$$Y=1.4481+0.6743X_1+0.0146X_3^2 \qquad (2)$$

where X_3 is the mean distance between trees in feet.

Growing space per tree is also area divided by number of trees. On an acre basis then, $X_2=\frac{43{,}560}{N}$.

Substituting in equation (1), it becomes

$$Y=1.4481+0.6743X_1+\frac{635.9760}{N} \qquad (3)$$

where N is the number of trees per acre.

Diameter growth after thinning is curvilinearly related to both spacing and number of trees to the acre. The rate of diameter growth increases with increased spacing, but decreases with increasing number of trees.

Mean diameters 20 years after thinning and average annual growth, computed from equation (3) for different numbers of trees per acre and initial diameters, are presented in Table 3.

Subsequent diameter growth was greater in stands of small initial diameter than in stands of larger initial diameter. The relationship was linear for all initial diameters studied. An increase of 1 inch in initial diameter was accompanied by a reduction of about 0.016 inch in subsequent mean annual growth regardless of whether the initial diameter was one or five inches or whether the initial number of stems was 200 or 1,200 (Table 3).

Basal area growth per acre.—Thinning usually increased net basal area growth per acre. Exceptions were the heaviest thinning in two of the younger stands and all thinnings in a 35-year-old stand that was growing well in an unthinned condition (Tables 1, 2). Basal area growth after thinning was generally greatest on the heavily thinned plots in the older and larger stands and on the lightly thinned plots in the younger and smaller stands.

Differences in basal area increment between age classes were due in large measure to differences in initial size and length of the period of overcrowding. Prethinning growth was slower in older stands. This is evident when increment on unthinned plots or plots thinned to similar intensities are compared between age classes. In every case, post-treatment increment was less in the older stands.

Ninety-four percent of the 20-year growth of basal area in square feet (Y) was accounted for by reserve basal area in square feet (X_1), and growing space per tree in square feet (X_2). The regression equation expressing the relationship

$$Y=47.7925+0.8507X_1-0.0688X_2 \qquad (4)$$

has a correlation coefficient of 0.9681 and a standard error of estimate of 11.30 square feet per acre.

TABLE 2.—PLOTS AFTER THINNING AND IN 1955

Location	Spacing	Trees per acre			Mean diameter			Basal area per acre		
		After thinning	1955	Mortality	After thinning	1955	Average annual increase	After thinning	1955	Mean annual increase
	Feet	*Number*		*Percent*	*Inches*			*Sq. feet*		
Arapaho N.F.	Unthinned	2,244	1,480	34.0	3.10	4.06	.031	117.53	133.30	0.51
	5.2× 5.2	1,608	1,324	17.7	3.27	4.46	.038	118.50	143.93	0.82
	8.4× 8.4	620	576	7.1	3.76	5.17	.045	47.91	84.01	1.16
	11.0×11.0	360	336	6.7	3.80	5.43	.074	28.32	53.98	1.17
Bighorn N.F.	Unthinned	5,334	4,818	9.7	1.56	2.30	.027	71.32	139.13	2.51
	8.4× 8.4	615	558	9.3	2.29	4.90	.097	17.64	73.37	2.06
	9.9× 9.9	449	407	9.4	2.27	4.99	.101	12.65	55.22	1.58
Shoshone N.F.	Unthinned	2,230	1,651	26.0	3.69	4.40	.034	165.92	174.13	0.39
	11.0×11.0	361	340	5.8	5.24	6.99	.083	54.13	90.46	1.73
	11.3×11.3	340	323	5.0	5.45	7.09	.078	55.11	88.32	1.58
Med. Bow N.F.	Unthinned	20,980	10,792	48.6	0.64	1.21	.026	48.58	85.98	1.70
	5.0× 5.0	1,752	1,392	20.6	1.17	3.00	.083	13.06	68.22	2.51
	7.2× 7.2	828	640	22.7	1.24	3.79	.116	6.91	50.16	1.96
	9.7× 9.7	464	404	12.9	1.22	4.12	.132	3.76	38.50	1.58
Med. Bow N.F.	Unthinned	8,880	6,120	31.1	1.66	2.33	.030	133.65	181.12	2.16
	7.4× 7.4	802	782	2.5	2.55	4.59	.093	27.85	91.10	2.88
	9.8× 9.8	450	438	2.7	2.96	5.55	.118	21.45	73.63	2.37
	12.5×12.5	280	272	2.9	3.12	6.19	.140	14.82	56.84	1.91
Med. Bow N.F.	Unthinned	2,018	1,818	9.9	3.66	4.40	.034	147.95	191.64	1.98
	9.9× 9.9	444	432	2.7	4.43	6.34	.087	47.46	94.68	2.15
	12.2×12.2	292	278	4.8	5.16	7.47	.105	41.70	84.62	1.95
	14.6×14.6	204	198	3.0	5.37	7.74	.108	32.21	64.69	1.48

TABLE 3.—AVERAGE DIAMETER 20 YEARS AFTER THINNING, ESTIMATED BY THE EQUATION $Y = 1.4481 + 0.6743X_1 + \frac{635.9760}{N}$

Initial number of stems	Number[1] of stems in 20 years	Initial diameter in inches[2] 1.0 Average diameter in 20 years	1.0 Average annual growth	2.0 Average diameter in 20 years	2.0 Average annual growth	3.0 Average diameter in 20 years	3.0 Average annual growth	4.0 Average diameter in 20 years	4.0 Average annual growth	5.0 Average diameter in 20 years	5.0 Average annual growth
		Inches									
200	195	5.30	.215	5.98	.199	6.65	.182	7.32	.166	8.00	.150
300	285	4.24	.162	4.92	.146	5.59	.130	6.26	.113	6.94	.097
400	375	3.71	.136	4.39	.120	5.06	.103	5.74	.087	6.41	.070
500	460	3.39	.120	4.07	.104	4.74	.087	5.42	.071	6.09	.054
600	545	3.18	.109	3.86	.093	4.53	.076	5.20	.060	5.88	.044
700	630	3.03	.102	3.70	.085	4.38	.069	5.05	.052	5.73	.036
800	715	2.92	.096	3.59	.080	4.27	.064	4.94	.047	5.61	.030
900	800	2.83	.092	3.50	.075	4.18	.059	4.85	.042	5.53	.026
1,000	880	2.76	.088	3.43	.072	4.11	.056	4.78	.039	5.46	.023
1,200	1,040	2.65	.082	3.33	.066	4.00	.050	4.67	.034	5.35	.018

[1]Obtained from figure 2.
[2]Values outside the lines in the body of the chart are extrapolated beyond the limits of the available data.

TABLE 4.—BASAL AREA PER ACRE IN 20 YEARS AFTER THINNING, FOR STANDS OF DIFFERENT INITIAL SIZES AND DENSITIES, ESTIMATED BY THE EQUATION

$$Y = 47.7925 + 0.8507X_1 - \frac{2996.9280}{N}$$

Initial number of stems	Number[1] of stems in 20 years	Initial diameter in inches[2] 1.0 Initial basal area	1.0 Basal area in 20 years	1.0 Annual basal area incr.	2.0 Initial basal area	2.0 Basal area in 20 years	2.0 Annual basal area incr.	3.0 Initial basal area	3.0 Basal area in 20 years	3.0 Annual basal area incr.	4.0 Initial basal area	4.0 Basal area in 20 years	4.0 Annual basal area incr.	5.0 Initial basal area	5.0 Basal area in 20 years	5.0 Annual basal area incr.
		Sq. ft.														
200	195	1.10	33.74	1.63	4.36	36.52	1.61	9.82	41.16	1.57	17.46	47.66	1.51	27.28	56.01	1.44
300	285	1.65	39.21	1.88	6.54	43.37	1.84	14.73	50.33	1.78	26.19	60.08	1.69	40.92	72.61	1.58
400	375	2.20	42.17	2.00	8.72	47.72	1.95	19.64	57.01	1.87	34.92	70.01	1.75	54.56	86.71	1.61
500	460	2.75	44.14	2.07	10.90	51.07	2.01	24.55	62.68	1.91	43.65	78.93	1.76	68.20	99.82	1.58
600	545	3.30	45.60	2.12	13.08	53.92	2.04	29.46	67.86	1.92	52.38	87.36	1.75	81.84	112.42	1.53
700	630	3.85	46.79	2.15	15.26	56.49	2.06	34.37	72.75	1.92	61.11	95.50	1.72	95.48	124.74	1.46
800	715	4.40	47.79	2.17	17.44	58.88	2.07	39.28	77.46	1.91	69.84	103.46	1.68	109.12	136.87	1.39
900	800	4.95	48.67	2.19	19.62	61.15	2.08	44.19	82.06	1.89	78.57	111.30	1.64	122.76	148.89	1.31
1,000	880	5.50	49.47	2.20	21.80	63.34	2.08	49.10	86.56	1.87	87.30	119.06	1.59	136.40	160.83	1.22
1,200	1,040	6.60	50.91	2.22	26.16	67.55	2.07	58.92	95.42	1.82	104.76	134.41	1.48	163.68	184.54	1.04

[1]From figure 2.
[2]Values outside the lines in the body of the chart are extrapolated beyond the limits of available data.

The equation indicates that basal area 20 years after thinning is related linearly to both basal area immediately after thinning and growing space per tree. The greater the initial basal area, the greater the basal area 20 years later; and the smaller the growing space, the greater the basal area 20 years later.

Substituting $\frac{43{,}560}{N}$ for growing space (X_2) in equation (4), it becomes

$$Y=47.7925+0.8507X_1-\frac{2996.9280}{N} \quad (5)$$

Basal area increment after thinning is curvilinearly related to both number of trees per acre and spacing. The rate of basal area increment increases with increasing number of trees and decreases with increased spacing.

Mean basal areas 20 years after thinning, computed from equation (5) for different initial basal areas and numbers of trees per acre are shown in Table 4. Basal area increment was greatest when initial size was smallest. Basal area increment was maximum for 1,200+ trees per acre when initial average diameter was 1.0 inch, 900 trees at 2.0 inches, 600 trees at 3.0 inches, 500 trees at 4.0 inches, and 400 trees at 5.0 inches. However, increment was so near to maximum that there is little practical advantage in retaining more than 600, 500, 400, and 300 stems per acre respectively in stands that averaged 1 or 2, 3, 4, and 5 inches in initial diameter.

Height growth.—Data on height growth provided by the study plots were not conclusive. In some blocks, growth on thinned plots was as much as 100 percent greater than on unthinned plots. In other blocks, height growth was greater on unthinned plots. No consistent relationship between height growth and age, size, or stand density could be identified from available data. Lodgepole pine probably requires some crowding for maximum height growth. It appears to decrease when at densities which cause stagnation or if stands are too open.

Discussion and Conclusions

Precommercial thinnings are made to: (1) concentrate growth on the best stems available for the final crop, (2) shorten the time required to grow trees to merchantable size, and (3) increase total yield. The results of this study show that precommercial thinnings are needed in dense second-growth stands of lodgepole pine in the central Rocky Mountains if usable crops are to be grown on a reasonable rotation.

A desirable practice for precommercial thinning would be to reduce stand density to a level where diameter growth will proceed at a rapid rate until minimum merchantable size is reached. At that time, growth of individual trees would begin to slow down, and the stand would be ready for a commercial thinning. Such a procedure is impractical for lodgepole pine. Observation has indicated that precommercial thinning to an intensity that will produce the greatest growth per tree opens up the stand too much. Height growth is retarded and tree quality sacrificed when large side branches and coarse, limby crowns are produced. Understocking may also be aggravated if the stand suffers heavy, unpredictable damage from climatic and biotic factors.

Objectives of precommercial thinning in lodgepole pine should be to: (1) promote maximum usable wood production and height growth, and (2) produce clear stems for a height of at least 16 feet. To attain these objectives, it will be necessary early in the life of the stand to reserve too many stems to get the most rapid growth of individual trees. But, if height and clear stems can be obtained early in life, the stand can be opened up later for rapid diameter growth. The excess trees will also provide a margin of safety in case of heavy mortality.

The data presented permit recommendation of levels of reserve stocking. Table 3 shows that diameter growth was best at the lowest stand density tested for all diameter classes. But in young stands the danger of curtailing height growth and producing large side branches is great if density is reduced too much. Table 4 shows that there is little advantage from the standpoint of total wood production in reserving more than 600 trees per acre in stands that will average 1.0 to 2.0 inches in diameter after thinning. Total growth approaches a maximum at this density and mortality increases rapidly at greater densities. For larger average diameters, fewer trees can fully utilize the site. Only about 300 trees per acre should be reserved for stands that will average 5.0 inches in diameter after thinning.

From a practical standpoint, intensity of precommercial thinning may not depend on silvicultural considerations alone. Management objectives and market conditions must also be considered. Thus far, there has been little market for lodgepole pine in small sizes. However, such markets may develop in the future, as the wood is well suited for the manufacture of pulpwood, particle board, and hardboard.

Growing space levels.—Although the present study may not define the optimum rate of stock-

TABLE 5.—GUIDELINE FOR PRECOMMERCIAL THINNING IMMATURE LODGEPOLE PINE, ALL DATA ON AN ACRE BASIS

Initial diameter	Reserve trees	Spacing	Years to reach 5.0 ins. d.b.h.
Inches	*Number*	*Feet*	*Years*
1.0	600	8.5×8.5	37
2.0	600	8.5×8.5	32
3.0	500	9.3×9.3	23
4.0	400	10.4×10.4	12
5.0[1]	300	12.0×12.0	—

[1]First commercial thinning.

ing for all stands in need of thinning, it did show that in lodgepole pine in several different localities growth response was closely correlated with changes in stand density. Further the results demonstrated conclusively that thinning in overly dense young stands of lodgepole pine is necessary to promote reasonable growth and reduce mortality.

No thinning guidelines are available for lodgepole pine. Consequently, the growth and mortality rates found have been used to set up a proposed schedule of thinning (Table 5). To develop Table 5, a market for trees 5.0 inches in diameter and larger was assumed. The number of trees that would yield the greatest usable wood production per acre in each diameter class was set as the level of growing stock to be reserved in a precommercial thinning. The number of years required for the tree of average diameter in each class to reach 5.0 inches d.b.h. was computed from the average annual diameter increments presented in Table 3. The number of trees surviving this period was determined by straight proportion from Figure 2. After an average diameter of 5.0 inches had been reached, the stands were considered ready for commercial thinning. By that time the quality of the trees should be definitely fixed. Subsequent management, by making repeated light cuts, should aim at laying on wood at the maximum rate. Stand density should be reduced at each thinning interval only to the extent necessary to maintain diameter growth and to avoid opening the stand too drastically at any one time.

A precommercial thinning reserving 600 trees per acre is recommended if the average diameter of the reserve stand will be 1.0 to 2.0 inches, 500 trees if average diameter will be 3.0 inches, and 400 trees per acre if average diameter will be 4.0 inches. Stands thinned to these densities should reach the assumed minimum salable size and be ready for commercial thinning in 12 to 37 years. In stands averaging 5.0 inches in diameter, a commercial thinning is assumed that will reduce density to 300 trees per acre.

If only one precommercial thinning can be made and trees must be carried until minimum sawlog size is reached (8 inches d.b.h.) before material removed is salable, the results of this study suggest a reserve stand of 300 stems per acre for all diameter classes. Maximum growth per tree is apparently greatest at 200 or less stems per acre, but somewhat greater densities are recommended to allow for unforeseen mortality and the risk of producing limby, coarse-crowned trees of low quality.

Summary

Studies were initiated between 1924 and 1934 on four national forests in Colorado and Wyoming to determine spacings for thinning small lodgepole pine. Twenty-two plots in stagnated and overstocked 35- to 78-year-old stands were selected for study. All plots, except one in each block, were thinned to different intensities. The remaining plot was left unthinned as a control. Plots were remeasured in 1955.

Diameter growth in all age groups was stimulated by the intensities of thinning tested. It was greatest on the most heavily thinned plots. Basal area increment per acre was also stimulated in most treatments. The greatest basal area growth followed heavy thinning in the older and larger stands and light thinning in the younger stands.

Regression analysis showed that diameter growth was greatest at the minimum density tested for all diameter classes within the range of available data, and that there is little advantage from the standpoint of total wood production in reserving more than 600 trees per acre in stands averaging 1.0 and 2.0 inches in diameter at the time of thinning. Total growth approaches a maximum at that density and mortality increases rapidly at greater densities. When initial diameter is 5.0 inches, total growth approached a maximum with as few as 300 stems per acre.

With a market for small-sized material and only one precommercial thinning possible, thinning to 600, 500, and 400 trees per acre is recommended when initial diameters are 1.0 to 2.0, 3.0, and 4.0 inches, respectively. For stands averaging 5.0 inches or more in diameter, a light commercial thinning leaving 300 trees to the acre may be possible in the future. If only one precommercial thinning can be made, and no market is available for subsawlog-sized material, a reserve of 300 trees per acre is recommended for stands averaging 1.0 to 5.0 inches in diameter.

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Increased Cone Production of Young Douglas-Fir Following Nitrogen and Phosphorus Fertilization

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WITH THE CURRENT intensification of forest practices in the Pacific Northwest, the demand for seed of the principal commercial species has become urgent. Douglas-fir (*Pseudotsuga menziesii* [Mirb.] Franco) in the Pacific Northwest is so irregular in its cone crop cycle, particularly in Washington and at higher elevations, as to cause difficulties to collectors seeking to fill cone quotas in specific areas. Yet individual trees, growing in lawns and other situations suspected of having a higher than average soil fertility level, often produce flower and cone crops in years when nearby "wild" trees are unproductive. Accordingly, the writers set up an experiment to test the effect of nitrogen and phosphorus fertilizer treatments on the production of cones and seed in a young stand of Douglas-fir. A secondary objective of the study was to explore the techniques required for the economic production of seed from young Douglas-fir stands maintained at varied levels of soil fertility.

The development of seed orchards is a common sense procedure urged as long ago as 1928 by Bates (*2*) and worked out in detail by European foresters following the leadership of Syrach-Larsen (*12*). An interim expedient, the development of seed producing stands, in which the better trees are induced to produce seed by the thinning out of the poorer trees, has been advocated by a number of foresters, and is already in use in the southern pine region (*5, 15*). Spacing is perhaps the only influence on seed production which is reasonably well understood. A recent study by Florence and McWilliam (*6*) develops in detail the relationships between spacing and cone production by young conifers of several species. In Douglas-fir, Shaw (*10*) reported increased catches of seed in traps under heavily-thinned stands of Douglas-fir when compared to the catches under less heavily-thinned or unthinned stands.

The effects of nutrition on seed production of forest trees has received little recognition, although for some time orchardists have shown the possibility of increasing production of fruit through the application of fertilizers. Chandler (*3*) increased seed production of beech and sugar maple in New York with the addition of a nitrogenous fertilizer composed of equal parts of ammonium sulphate and sodium nitrate. Gemmer (*8*) and Wenger (*14*) reported an increase in cone production of longleaf and loblolly pine through the application of a complete fertilizer. With the application of ammonium phosphate (16-20-0), Schubert (*9*) was able to triple the cone production of sugar pine in California. In spite of these promising tests of fertilizer on forest trees, many questions remain to be answered in respect to the optimum levels of nutrition for the maximum yield of cone and seed of Douglas-fir.

Methods

During the spring of 1955, a 20-year-old stand of open-grown Douglas-fir was selected at an elevation of 1,800 feet near the town of Yacolt in the foothills of the Cascade Mountains in southwestern Washington. The soil is a shallow, silty-clay loam with about 50 percent gravel grading into parent material of fractured basalt at a depth of 24 inches. Although unmapped, this soil is similar to Wilkeson silt loam, hilly phase. Four soil pits, one in each block of the area, were sampled to parent material for a nutrient analysis to check the uniformity of the area. Results of the analysis of the surface layer are presented in Table 1. The levels of all nutrients except phosphorus appear quite high. Indeed,

TABLE 1.—SOIL ANALYSES, THE 0 TO 6-INCH LAYER, ON BLOCKS BEFORE FERTILIZER TREATMENT[1]

Block	Exchange capacity	Organic matter	Total nitrogen	Available P_2O_5	Available K_2O	Exchangeable CaO	Exchangeable MgO
	Me./100g.	*Percent*	*Percent*	*Ppm*	*Ppm*	*Ppm*	*Ppm*
I	31.4	10.5	0.23	2.2	200	620	120
II	31.4	13.2	.28	3.0	376	1780	260
III	25.3	8.0	.20	4.4	526	1200	200
IV	24.8	6.3	.15	1.7	720	1420	245

[1]Based on duplicate samples from one soil pit in each block, collected in May 1955 and analyzed by procedures suggested by the Forest Soils Committee of the Douglas-Fir Region (*7*).

THE AUTHORS are respectively, forest soils specialist Weyerhaeuser Company, Forestry Research Center, Centralia, Wash.; technical director, Col. W. B. Greeley Forest Nursery, Nisqually, Wash.; and instructor, College of Forestry, University of Washington—formerly research forester, Col. W. B. Greeley Forest Nursery.

the organic matter level is high considering that the area was burned five times by wild fires between 1903 and 1926. This stand was selected because it was uniformly stocked with full-crowned trees which were at the point of crown closure and nearing the reproductive age. Trees over 6 inches in d.b.h. ranged from 15 to 22 years in age. The larger trees ranged from 40 to 45 feet in height, indicating Site II for Douglas-fir.

Two blocks were laid out on each side of an all-weather road through the stand. Each block consisted of 5 square quarter-acre plots separated by 30-foot buffer strips. On each plot, crop trees were left to give a spacing with a minimum of 5 feet between crowns. Occasionally a small tree was retained to fill an opening in the stand. When there was a choice, the better or more vigorous tree was retained as a crop tree. Then crop trees were pruned to a height of 6 feet, and numbered. Following this, the non-crop trees were felled and all slash removed from the plots, piled and burned. Figure 1 shows a portion of two typical plots. All trees and brush were removed from the buffer strips around each plot. Originally, the stand contained 160 trees per acre. After thinning, the number of trees per acre averaged 76, with a total of 381 experimental trees on the 20 plots. The diameter range after thinning showed a normal distribution from 1 to 14 inches and averaged 6.8 inches.

The five plots in each block were randomly assigned the following fertilizer treatments:

Symbol	Fertilizer broadcast in pounds per acre N (as ammonium nitrate)	P_2O_5 (as superphosphate)
Control	0	0
2N - 2P	100	100
2N - 4P	100	200
4N - 2P	200	100
4N - 4P	200	200

These nutrients were selected as being the most commonly limiting in Pacific Northwest forest soils as indicated by data of Walker et al. (*13*) and the original soil analyses from each block. The plots in the first two blocks, except for the controls, were prepared by July 21, 1955. On this date the fertilizer treatments were weighed and spread uniformly by hand on each plot. By the first week in September, the remaining plots were prepared, and Blocks III and IV were fertilized in the same manner on September 7 and 8, 1955. In April 1956, the four control plots were thinned and cleaned. This later date of thinning should have had little effect on cone production as these trees were open-grown and not visibly competing. On May 2, 1956, each fertilized plot was split and the original fertilizer treatment was repeated on half of each plot. This second fertilizer application was made to see if a higher level of nutrients would have an effect on the 1957 cone crop. During May, 1957 the initial fertilizer treatment was reapplied to each plot. A complete series of soil and foliage samples were obtained from each plot in 1955, 1956, and 1957 for analyses to be reported in another paper.[1]

In June 1955, continuous individual-tree records were initiated with diameter measurements on all trees in the plots. Diameters were remeasured after the growing season in September 1956 and 1957. Numbers of flowers per tree were estimated in April 1956, and again in 1957. In July 1956, each of the 132 cone-bearing trees was banded with 17-inch sheet aluminum to prevent squirrels from collecting cones.

The first cone crop was harvested in August 1956. A ladder truck was used on three plots, but old down logs, stumps and micro-relief prevented further use. On the remaining plots, all trees with more than 20 cones were climbed and hand picked. The cones were counted with binoculars on the trees bearing fewer than 20 cones. A warm dry wind which opened cones caused a loss of the seed from the four fertilized plots in Block III before the cones were picked. The newly-picked cones, spread out in trays exposed to full light in a greenhouse, opened satisfactorily by mid-October. Seed was extract-

FIG. 1.—Portions of two plots after thinning and pruning (August 1955). Bracken fern was knocked down in the process of slash removal. Aluminum bands on bearing trees were installed to prevent squirrels from climbing the trees to cut cones.

[1]Prof. Stanley P. Gessel, College of Forestry, University of Washington, who was associated with this study from its inception, has cooperated on this phase of tissue and soil analyses.

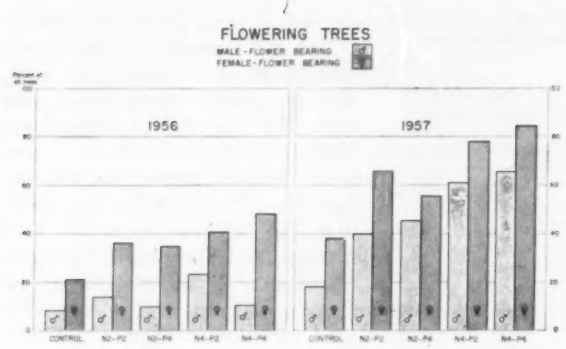

FIG. 2.—Summary of flowering by fertilizer treatment.

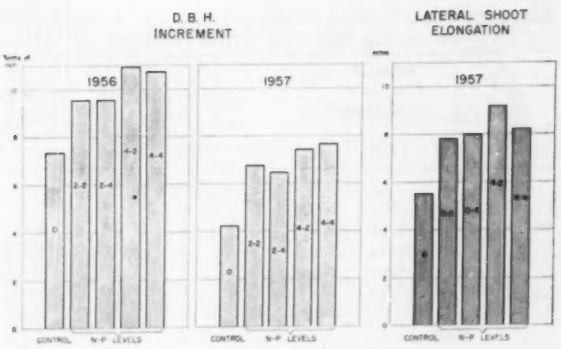

FIG. 3.—Summary of d.b.h. increment and lateral shoot elongation by fertilizer treatment.

ed and de-winged manually, then cleaned in a Clipper mill to a high degree of soundness. Forty cones from each of the trees which bore sufficient cones were measured for length to the nearest 0.1 inch. Both the weight of 1,000 filled seeds and the total weight of filled seed were determined for each tree.

Despite a heavy flower crop in 1957, massive insect attack on the developing cones made it impractical to collect cones in the autumn of 1957. Instead, in September 1957, cones visible from the southwest of each tree were counted carefully with binoculars. At the same time, 3 branch tips were collected, with the aid of a pole pruner, from the mid-crown of each of 3 widely separated trees in each half-plot for lateral shoot elongation measurements and tissue analyses.

The male and female flowering of trees in 1956 and 1957 are depicted in Figure 2 and grouped by fertilizer application. The fertilizer treatments resulted in increased percentages both of trees flowering and trees bearing heavier flower crops. The heaviest flower crop occurred following the 1956 fertilizer applications. The general predominance of female over male flowering is not unusual in very young conifers.

The diameter and lateral shoot growth data presented in Table 2 and Figures 3 and 4 leave no doubt that the fertilizer increased the overall vigor of these young trees. Analysis of variance (*11*) showed no significant differences in the average initial diameters which were measured before fertilization. The diameter increases in Table 2 include the growth for about one and one-half growing seasons in 1956 and a single growing season in 1957. Analyses showed that the 1956 diameter increases from the July 1955 fertilizing significantly exceeded ($P = 5$ percent) the increases from fertilizing in September; and both of these fertilizer treatments and repeat application in May 1956 on the half plots resulted in diameter increases significantly ($P = 1$ percent) greater than on the control. The 1957 treatments nearly doubled the diameter increment for that growing season when compared to the control; however, neither the 1957 diameter nor lateral shoot growth differed significantly with date of initial 1955 fertilizer application.

In addition to increasing the number of trees bearing cones, fertilizer applications quite consistently increased the number and length of cones produced as can be seen in Table 3. The 1955 fertilizing in July resulted in a significant ($P = 1$ percent) increase in num-

TABLE 2.—INITIAL D.B.H. DIAMETER INCREMENT, AND LATERAL SHOOT ELONGATION OF DOUGLAS-FIR TREES ON PLOTS AVERAGED BY FERTILIZER TREATMENT

Treatment	Date of fertilizer application			Trees, basis	D.b.h. average			Lateral shoot elongation in 1957 (Sept.)
					Initial 1955 June	Increment for— 1956 Aug.	1957 Sept.	
	1955	1956	1957	*No.*	*Inches*	*Inches*	*Inches*	*Inches*
Control	None	None	None	19	6.9	0.75	0.41	5.4
		None	None	19	6.8	.75	.45	6.2
	None	None	None	18	6.7	.76	.42	5.2
		None	None	19	6.9	.68	.43	5.6
2N-2P	July	None	May	17	6.5	.98	.67	8.0
		May	May	19	7.0	1.02	.70	7.8
	Sept	None	May	22	6.5	.88	.64	7.4
		May	May	19	7.4	.96	.67	7.9
2N-4P	July	None	May	20	6.5	.84	.55	7.1
		May	May	21	7.7	1.00	.79	7.8
	Sept	None	May	20	6.6	.94	.61	8.4
		May	May	23	6.3	1.07	.60	8.8
4N-2P	July	None	May	21	6.9	1.04	.73	8.8
		May	May	17	6.6	1.14	.79	9.3
	Sept	None	May	20	6.0	1.04	.67	8.8
		May	May	15	6.5	1.14	.78	10.2
4N-4P	July	None	May	20	7.7	1.02	.76	8.3
		May	May	17	7.4	1.09	.79	9.4
	Sept	None	May	17	6.2	1.04	.73	7.1
		May	May	16	6.9	1.13	.78	8.3

TABLE 3.—CONE BEARING TREES, NUMBER AND AVERAGE LENGTH OF CONES BORNE BY DOUGLAS-FIR TREES ON PLOTS AVERAGED BY FERTILIZER TREATMENT

Treatment	Date of fertilizer application 1955	1956	1957	Cone bearing trees per ¼-acre in— 1956	1957	Average length cones 1956	Cone yield per ¼-acre— 1956 count	1957 estimate
				No.	*No.*	*In.*	*No.*	*No.*
Control	None	None	None	4	5	2.4	420	440
		None	None	4	6	2.5	720	420
	None	None	None	3	7	2.5	370	270
		None	None	7	11	2.6	390	760
2N-2P	July	None	May	6	9	2.6	960	160
		May	May	10	13	2.4	4240	2000
	Sept	None	May	4	9	2.7	710	610
		May	May	6	15	2.8	920	1780
2N-4P	July	None	May	7	9	2.6	1240	150
		May	May	11	13	2.8	5860	1110
	Sept	None	May	4	12	2.6	660	990
		May	May	5	17	2.8	870	1530
4N-2P	July	None	May	10	11	2.7	3580	1250
		May	May	8	14	2.8	3070	1620
	Sept	None	May	5	12	2.8	650	2150
		May	May	6	14	2.9	1740	2320
4N-4P	July	None	May	11	14	2.7	3460	890
		May	May	10	15	2.8	3600	970
	Sept	None	May	5	12	3.0	2050	830
		May	May	6	12	3.0	1340	2840

ber of cones over those fertilized in September. Also, cone length showed significant increases (P = 1 percent) with the fertilizer treatments. On the cone yield data (Table 3) analyses of variance showed that 1956 cone counts all differed significantly (5 percent level) among treatments, except between 2N-4P and 4N-2P. The 1957 cone estimates (which were not analysed statistically) indicated little difference with date of 1955 treatment, but some increase from the 1956 refertilization.

Total seed weight, (Table 4) showed a significant (P = 5 percent) increase with fertilizer treatment but not for time of application. The weight of seed following 2N—2P treatment was significantly (P = 5 percent) greater than that produced on the control plots. The 2N—4P and 4N—2P treatments showed a very highly significant (P = 0.1 percent) increase over control in total weight of seed. Moreover, the total weight of seed from the 4N—4P treatment was highly significantly (P = 1 percent) greater than the 2N—4P and 4N—2P treatments. This shows that the higher levels of both nitrogen and phosphorus produced significant (P = 5 percent) increases in total seed weight. The seed data are presented for individual blocks because in Block III, with the exception of the control plot, seed flew before the cones were collected. Analysis of variance showed no significant effects of fertilizer treatments on the weight of 1000 seeds which varied from 9.4 to 15.2 grams.

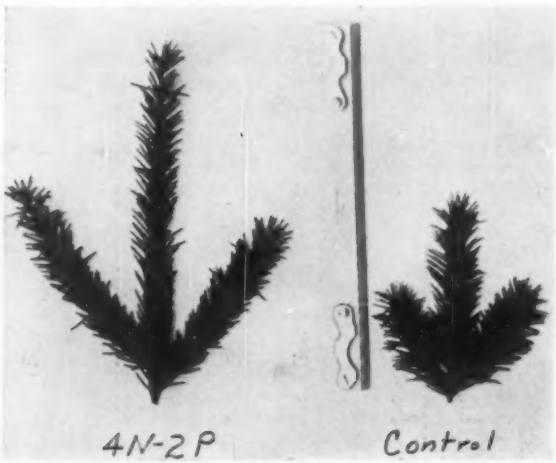

FIG. 4.—Comparison of 1957 lateral shoot growth representing average size from triplicate sampling of 24 Douglas-fir trees on the 4N-2P fertilized and the control plots.

Discussion

In recognition of the likelihood of individual tree variation, we included a large number of trees in the experimental plots. When the individual trees were ranked by diameter classes, some rather striking departures from the usual relationship between diameter class and cone production were noted. This variation in reproductive behavior of individual trees is probably a reflection of two basic causes: inherent life-long differences between individual trees and differences in age at which individual trees commence to produce regular and heavy seed crops. Analysis of individual tree data shows that it is in the lower diameter classes that the fertilizer treatments have had their greatest effect in moving trees into the cone bearing category. In 1957 the smallest diameter tree bearing cones on the control plots was 7.0 inches. On the fertilized plots, several trees under 4.0 inches d.b.h., including a 2.6-inch tree, bore cones.

The total 1956 production of the four replicated ¼-acre plots showed a yield of 1,880 cones and 1.2 pounds of sound seed on the control plots; 6,810 cones and 4.5 pounds of sound seed on the 2N—2P plots; and 10,460 cones and 10.3 pounds of sound seed on the 4N—4P plots (Figure 5). This

TABLE 4.—WEIGHT OF SEED FROM 1956 CONE CROP OF DOUGLAS-FIR TREES ON BLOCKS BY FERTILIZER TREATMENT

Treatment	Date of fertilizer application 1955	1956	Weight of seed from 1956 cone crop per ¼-acre Block I	Block II	Block III	Block IV
			gms.	*gms.*	*gms.*	*gms.*
Control	None	None	4	117	133	0
		None	129	75	5	79
2N-2P	July	None	360	28	[1]	275
		May	258	400	[1]	229
2N-4P	July	None	151	221	[1]	5
		May	910	1011	[1]	101
4N-2P	July	None	763	448	[1]	111
		May	367	469	[1]	17
4N-4P	July	None	418	582	[1]	828
		May	968	471	[1]	227

[1]Seed lost from trees before cones were picked.

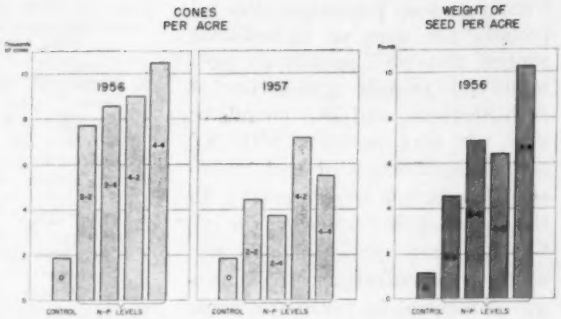

FIG. 5.—Summary of cone production and seed yield by fertilizer treatment.

early response to fertilizer application was unexpected. We had not expected to find, in the reproductive activity of the experimental trees in 1956, a reflection of the fertilization applications made in the late summer and early autumn of 1955. However, the flower production counts revealed that flower emergence in 1956 had been influenced markedly by the 1955 fertilizer applications.

Little work has been reported on the reproductive chronology of Douglas-fir. Allen (*1*) has reported external indications of strobilus production to be expected in the following year. From these indications it appears that by the early part of September in the Pacific Northwest, conelet buds are well laid down. Examination of the experimental trees during cone collection in late August and September, 1956 identified abundant and readily recognizable conelet and catkin buds for 1957. A satisfactory explantaion of the 1956 responses in flower and cone production to fertilizer application is difficult. Two hypotheses are advanced.

Regarding the conelet buds, one may postulate that the determination whether a given bud will be vegetative or reproductive may not be complete. In other words, it is possible that a vegetative bud may be switched to a conelet bud if, early in its development, say late in summer, its nutrition is changed in such a way as to favor this switch. The fact that proliferated cones, that is, cones with vegetative shoots emerging from their apices, are not rare in Douglas-fir suggests that the buds are somewhat labile even after they appear to have been determined. Since catkin buds are differentiated by position as well as by function from vegetative buds, a different hypothesis must be sought. Perhaps, catkin buds may be laid down later than normal if favorable nutritional changes occur in late summer. On the other hand, catkin primordia may, in many cases, simply remain primordial unless nutritional conditions encourage them to complete development.

It should be pointed out that the 1955 growing season was colder and wetter than normal, and the inception of growth was delayed as much as six weeks in some areas. The unusually late growing season may have delayed bud development until after fertilizer application. In November, 1955, a sudden severe freeze occurred with no record of previous frost. This freeze caused damage to forests in most of western Washington and killed back the terminals from 1 to 4 years on approximately half the plot trees (*4*). Although there was no relationship between the degree of frost damage and the number of cones, there is a possibility that the increase in flower and cone production may be a measure of the frost resistance of fertilized buds. These hypotheses are advanced with no great assurance, but rather with the hope that they may stimulate some basic studies of bud differentiation and development in respect to mineral nutrition.

The present study will be continued, as many questions of theoretical and practical importance remain to be answered. Among these are such questions as the levels of nitrogen and phosphorus which will induce maximum production, and the effect of these nutrient levels on the frequency of bearing years. Nitrogen and phosphorus fertilization on these plots indicated a positive increase in tree vigor with resulting increase in cone and seed production. The 1957 cone crop showed the highest yield from the application of 200 pounds N and 100 pounds P_2O_5. As the individual tree variations in seed production level out to some extent, as indicated in 1957, it may be possible to determine whether the fertilizer treatments have any appreciable effects on size and germination behavior of seeds and on the vigor of the seedling progeny.

Summary

Applications of ammonium nitrate and superphosphate were broadcast on 20 quarter-acre plots laid out in a 20-year old stand of Douglas-fir in southwestern Washington. Levels of application were 100 and 200 pounds per acre of N and of P_2O_5 in four combina-

tions and an unfertilized control. First-year seed production was 1.2 pounds per acre on unfertilized control plots; 4.5 pounds on plots with 100 pounds application of each nutrient; and 10.3 pounds of seed per acre on plots with 200 pounds application of each nutrient. Treatments were repeated. In the second spring following the initial fertilizer application, 37 percent of the unfertilized trees produced flowers; 56 percent of those with 100 pounds per acre of each nutrient; and 75 percent of those treated with 200 pounds per acre of nitrogen and phosphate produced flowers . The greatest response in growth and cone production was shown to be attributable to the nitrogen applications although increases occurred with an application of phosphorus in conjunction with the higher levels of nitrogen.

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Survey of Professional Income of Foresters

Authorized by the Council, SAF, an anonymous questionnaire will be sent to Society members early in 1960 to obtain current data on professional income of foresters. Such information should be of use to individual foresters in measuring their rate of progress in the profession, to counselors in advising prospective foresters on income possibilities, and to employers in their programs of recruitment.

This questionnaire is considerably more comprehensive than the spot survey made by post card last year by the Education Study. In the present survey it is the plan to relate professional income to years of experience, major course of study, educational background, region where employed, class of employer, general type of work, and major field of specialization.

Cooperation in completing the form and returning it to the Society's office in Washington is urgently solicited.

Relative Diameter Growth Rates of Five Upland Oaks in West Virginia

George R. Trimble, Jr.

MANY FORESTERS have observed that differences in diameter-growth potential appear to exist among some tree species. Yet, few data are available to measure these differences, especially where trees are growing under comparable conditions. And for many species, the relative potential diameter growth rates are purely a matter of speculation.

Such speculation has often been in error because frequently it has been based on comparisons between some trees on good sites and others on poor sites, or between dominant trees and others more often overtopped in mixed stands ,or between trees in thinly stocked stands and those in densely stocked stands. Valid comparisons of diameter-growth potentials require that the different species be observed on comparable sites and under comparable conditions of health, position in the stand, past history, and stand density.

As part of a more comprehensive study involving the upland oaks in West Virginia, diameter-growth rates of northern red oak (*Quercus rubra* L.) and chestnut oak (*Q. prinus* L.) were observed under similar conditions and reported in 1957 (*13*). Since then, growth data have been compiled for three more upland oaks in the area: scarlet oak (*Q. coccinea* Muenchh), black oak (*Q. velutina* Lam.), and white oak (*Q. alba* L.). The relative growth rates of these five oaks are described here.

Methods

Ten-year diameter growth on increment cores is measured at d.b.h. (inside the bark) on a large number of individual oak trees throughout West Virginia and also in Garrett County, Maryland. The trees were found in reasonably well-stocked, even-aged stands on upland sites. The stands, with ages from 37 to 150 years, occurred on a range of sites having oak site indexes from below 40 to above 80.[1] The growth data for each species were stratified in three ways: (1) by d.b.h. classes, (2) by site index of the stand, based on Schnur (11), and (3) by vigor class.

Depending on the species, the vigor classifications that have been developed for different hardwoods vary somewhat in emphasis. However, they are all based on size and shape of crown, position in the stand and other features. The vigor classification of Holcomb and Bickford (*6*) was used as a basis for the oak classification, but it was modified somewhat following the classifications of Cummings and Zarger (*4*) and Burkle and Guttenberg (*2*). The four vigor classes used are:

Vigor I.—A tree with a large, healthy, full crown in a dominant or codominant position. Half the crown or more is exposed to direct sunlight. The crown is dense, with no evidence of disease or injury. Crown condition and position are more important than total length.

Vigor II.—A tree with a fair-sized crown in a codominant position. Less than half the crown is exposed to direct sunlight. The crown is less dense and not so perfect as that of a Vigor I tree. This class may also include large-crowned trees that fail to meet the requirements of Vigor I because of mechanical injury or dying limbs.

Vigor III.—A tree with a medium to small crown usually in an intermediate position. Only the tip is exposed to direct sunlight. The crown may be open, with some dead or broken limbs, or thinly foliated. This class also includes trees with fair to large crowns in a codominant position that cannot meet the requirements for a Vigor II tree.

Vigor IV.—Usually, a tree with a small crown in an overtopped position. This class includes all living trees that fail to meet the requirements of higher vigor classes.

Crown size, as a criterion of vigor class, refers to the relative crown size of trees in the same stand.

In determining the vigor class of a tree, dominance and crown size were given equal weight. For example, while only a dominant or codominant tree could be classed as Vigor I, only those dominants and codominants were so classed that had crowns that were large and vigorous relative to other trees in the same stand.

Sample trees were selected for all five oaks among the four vigor classes on practically all sites (Table 1).

Because the data were gathered in two stages (red oak and chestnut oak were measured 3 years before the others), the analysis was also made in two stages .

The first step with the red and chestnut oak data was an analysis of variance to determine: (1) if differences existed between the two species by site index and vigor classes, and (2) if differences existed within the species by site

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[1]Site index of oaks is defined as the average height of dominant and codominant trees at 50 years of age.

index and vigor classes.

After this, the second step was to plot separately for the two species the past 10-year diameter growth (i.b.) by vigor class over site index. This indicated a straight-line relationship, which permitted the development of linear regressions of growth over site index for the separate vigor classes. These regressions were developed for all vigor classes where site index was significantly correlated with diameter growth.

Third, the effect of tree size on diameter growth was measured by regression analysis separately for each species and each vigor class. Diameter growth was the dependent variable; d.b.h. and site index, the independent variables.

Growth-measurement data on black, scarlet, and white oak were compiled in the same way as with red and chestnut oak—by vigor class, d.b.h., and site index. Growth by vigor class was plotted over site index; and, as with red and chestnut oak, straight-line relationships were indicated.

The next step was to compare, by vigor class and site index, the growth rates of the three additional species to each other, and to the growth rates of red and chestnut oak. From the first compilation, growth rates of certain species were obviously similar. This helped indicate what comparisons should be made. Following Snedecor, Fisher's "t-test" was used to make the analyses (*10*). Where no significant differences between species were indicated and site index showed a significant effect, data for individual species were combined to determine regressions of growth over site index. Where there were differences between the red or chestnut oak and the three additional species, growth was compared on a percentage basis since the data for the last three species were alone insufficient for reliable regressions.

Results

Differences among species.—When comparisons are made among the five oaks within similar vigor classes and on similar sites, significant differences show up. These differences are most apparent—in some cases only apparent—with trees in Vigor Class I. This is logical since trees of this vigor class are less affected by environmental factors and thus are more free to grow and express their growth potential. Increasingly, going from the higher toward the lower vigor classes, the factor of competition masks differences in inherent growth potential. Diversity in tolerance between the species can be expected to introduce a variable interplay of effects resulting, perhaps, in smaller measurable differences and certainly in a greater variability in growth rates. Both of these results call for more measurements to detect significant differences. This means that while the data may not show significant differences between some species in the lower vigor classes, there actually may be small differences that could be detected with more intensive sampling.

Table 2 shows the growth rates of the five species at site index 70. Seventy was chosen as the class for comparison because it is the site index with the most sample trees and also represents somewhere near an "average" site index for the area.

The following findings, indicated in Table 2, might be noted:

For Vigor Class IV trees, there are no significant differences in growth rate among species (or site indexes either). The growth figures shown are an average of all data.

For Vigor Class I trees, black oak growth is approximately 90 percent of red oak growth.

Black oak growth, as sampled was not significantly different from red oak growth for Vigor Classes II and III trees so the data were combined for the two species.

Chestnut and scarlet oak growth rates showed no significant difference across the range of vigor classes so the data were combined for the two species.

TABLE 1.—NUMBER OF SAMPLE TREES OF EACH SPECIES, BY SITE INDEX AND VIGOR CLASS

Species	Vigor class	Site index 40	50	60	70	80	Total
Red oak	I	1	1	23	63	33	121
	II	4	7	80	132	62	285
	III	2	1	35	60	28	126
	IV	1	..	13	14	6	34
Chestnut oak	I	3	3	8	7	1	22
	II	19	17	27	24	16	103
	III	5	6	13	16	11	51
	IV	2	3	5	8	1	19
Black oak	I	..	..	8	12	..	20
	II	3	4	9	22	..	38
	III	..	4	6	5	..	15
	IV	..	..	..	1	..	1
Scarlet oak	I	2	16	14	4	2	38
	II	1	31	14	9	2	57
	III	..	5	5	5	..	15
	IV	..	..	..	1	..	1
White oak	I	1	1	11	6	2	21
	II	6	16	6	8	3	39
	III	1	12	6	17	1	37
	IV	..	2	2	7	..	11
Total		51	129	285	421	168	1,054

TABLE 2.—TEN-YEAR D.B.H. GROWTH RATES AT SITE INDEX 70, IN INCHES, INSIDE BARK

Species	Vigor class I	II	III	IV
Red oak	2.63	1.94	1.17	0.55
Black oak	2.37	1.94	1.17	0.55
Chestnut and scarlet oak	2.15	1.68	1.00	0.55
White oak	1.76	1.38	1.00	0.55

White oak growth rate for Vigor Classes I and II is approximately 82 percent of growth of chestnut and scarlet oak.

For Vigor Class III, the trees sampled showed no significant differences between chestnut, scarlet, and white oak; so the data were combined.

On the basis of the relative growth rates found for Site 70 (Table 2), and considering Vigor Class I trees as best expressing the diameter-growth potential of the species, the five oaks can be rated in the following descending order of diameter-growth rate: red oak, black oak, chestnut and scarlet oak, and white oak. Taking red oak (Table 2: Vigor I, site index 70) as 1.00, the relative numerical rating of the others would be: black oak —0.90, chestnut and scarlet —0.82, and white oak —0.67.

Differences among vigor classes.—The preceding section indicates the effect of vigor class on diameter growth. For each species, the analysis showed a significant growth difference among all vigor classes. This was to be expected: the vigor classification was designed to indicate, by external appearance and position in the stand, the relative degree to which the individual tree on a given site is expressing its growth potential.

Differences among site indexes.—Regression analysis and use of Fisher's t-test of diameter growth over site index gave the following information by species:

1. *Red oak.*—Diameter growth is directly related to site quality for trees in Vigor Classes I and II, but not in Vigor Classes III and IV.

2. *Black oak.*—Not enough data were taken across the range of site indexes to derive good regressions. However, analysis indicated that black oak growth reacted to changes in site much the same as red oak. For Vigor I trees, red oak grew faster—about 10 percent faster—at the 5 percent level of significance. For Vigor Classes II and III, there were no significant differences between the species across the ranges of site indexes.

3. *Chestnut oak.*—Diameter growth of chestnut oak is related to site quality for trees in Vigor Classes I, II, and III, but not IV. Perhaps the greater tolerance of chestnut oak as compared to northern red oak minimized the effect of competing vegetation in Vigor Class III to the extent that the influence of site factors could be statistically detected even though the effect of site on growth appears to be slight in this vigor class.

4. *Scarlet oak.*—Scarlet oak data, compared through the "t-test" to chestnut oak growth (from the regression) of the same vigor and site-index classes, showed no significant differences for any of the vigor classes. The regression for these two species combined showed a significant effect of site index for the first three vigor classes.

5. *White oak growth.*—White oak growth by site index for Vigor Classes I and II was the lowest for these classes of any of the oaks. "T-test" analysis showed that for these two vigor classes it was lower than chestnut oak growth at the 1 percent level of significance. For both Vigor Classes I and II, white oak growth was approximately 82 percent of chestnut oak growth. For Vigor Class III, however, there was no significant growth difference between the two species. While insufficient data were available to determine white oak regressions, the t-test analysis indicates that white oak probably reacts to site for Vigor Classes I, II and III.

6. *Regressions.*—The regressions and growth relationships to site index are shown graphically in Figure 1.

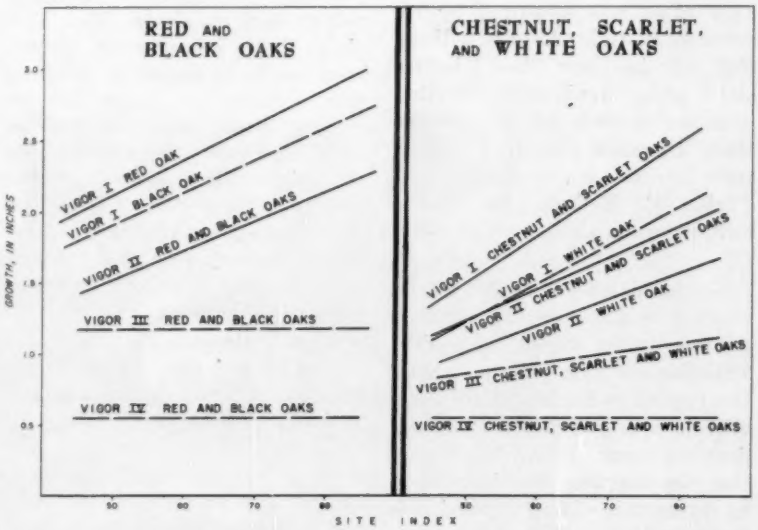

FIG. 1.—Regressions and growth relations to site index. Curves show 10-year d.b.h. growth (in inches, inside bark) over site index. Solid lines represent regressions; dashed lines either percentage relationships or averages.

TABLE 3.—EFFECT OF TREE SIZE ON DIAMETER GROWTH OF VIGOR I NORTHERN RED OAK IN LAST 10 YEARS, BY SITE INDEX CLASSES
(In inches, inside bark)

Site index	D.b.h. (in inches)						
	10	12	14	16	18	20	22
80	3.27	3.11	2.95	2.79	2.63	2.48	2.32
70	2.91	276	2.60	2.44	2.28	2.13	1.97
60	2.56	2.40	2.25	2.09	1.93	1.77	1.62
50	2.21	2.05	1.89	1.74	1.58	1.42	1.26
40	1.86	1.70	1.54	1.38	1.23	1.07	.91

As occurs with species differences, the differences in growth attributable to site quality are more pronounced in general for trees of the higher vigor classes. This is well illustrated by the fact that the data for red and black oak (combined) for Vigor Class III show no significant differences due to site index, while both Vigor Classes I and II do show significant differences. Here again, it is probably a case of growth differences for the lower vigor classes being masked by the influence of environmental factors in the stand. The maximum effect of this masking occurs, of course, in Vigor Class IV where the data show no influence of either side index or species difference.

Differences by tree sizes.—Of all the species, only for red oak was there a sufficient range in diameters to make a reliable test for the effect of tree size on growth. This effect was measured by regression analysis. Results indicate that only in Vigor Class I is tree size a factor significantly affecting diameter growth of the sample trees. Diameter growth of Vigor I trees decreases as tree size increases (Table 3). Yellowpoplar studies have shown a similar relationship (*6*).

No significant growth differences relating to diameter were detected for trees in the other vigor classes. This does not necessarily mean that the typical reduction of diameter growth with increase in diameter does not occur. It may mean only that the sampling was insufficient to detect this difference, which is undoubtedly smaller and increasingly masked with decreasing tree vigor.

The effect of tree size on growth of Vigor I red oak is expressed in the following equation:

$Y = 1.2373 + (0.0352)\ X_1 - (0.0788)\ X_2$ where Y is 10-year diameter growth (i.b.), X_1 is site index, and X_2 is d.b.h. Standard error of estimate is 4.8 percent and correlation coefficient (R) = 0.89, which is significant at the 1-percent level.

Observations and Conclusions

It would be remiss not to recognize some of the weaknesses of this study. An important one is the insufficiency of the data to permit defining more exactly the slopes of the regression lines. We cannot say for each species and each vigor class whether the differences in growth shown to be of overall significance are the same for each site index. This is especially true for black and white oak, for which the data were too few across the range of site indexes to permit the development of regressions. Still another weakness, which contributes to the error term, is the subjective nature of the classification of vigor. Errors in measurement of site index also contribute to the residual error of diameter growth.

The growth rates measured in this study are from unmanaged, relatively even-aged, reasonably well-stocked stands in West Virginia. Under management, growth rates can be increased by thinning that reduces the competition to residual trees; except in the case of Vigor I trees, this will upgrade the vigor classification of the residuals. These Vigor I trees, too, would be expected to show an increased growth rate, even though they would still fall in the same vigor classification.

Vigor classes are arbitrary groupings and the "vigor" factor is actually a continuous variable as is the diameter-growth rate associated with it. Thus, Vigor I trees in a stand are susceptible to having their growth rate increased by thinning that increases their vigor—even though they remain Vigor I trees since perforce this is the topmost category.

This relationship of thinning to vigor is borne out by past work. Studies by Holsoe show that cutting in a stand increases the diameter growth of dominant yellowpoplar (*7*). (In most cases, trees classified as dominants are Vigor I trees.) Holsoe classified his trees as dominants, codominants, and intermediates. It is interesting to note that the trees he classified as intermediates before release showed the greatest percentage increase in basal area growth after release. Codominants were next, and dominants last in the percent increase in growth following release.

In connection with the comparison of the rates of diameter growth of the oaks, it is pertinent to mention the results of site studies that have indicated the rate of height growth of the same species. In West Virginia, Trimble and Weitzman found no significant difference in site indexes (and this is an indirect measure of height growth) of dominant and codominant red, chestnut, black, and scarlet oaks on the sites where they were found together (*12*). These authors found white oak site index significantly lower. Doolittle, in a study in North Carolina, found this same relationship (*5*).

The growth data (both diameter and height growth) used in the present study and in the studies referred to were taken mostly on trees that had not reached maturity. Thus, they are not necessarily indicative of the relative eventual size—either total height or maximum diameter—reached by these species. The literature indicates that, in general, white oak and northern red oak attain a greater maximum size and age than the other three species (*1, 3, 8, 9*).

As a result of the study reported here, it is possible to compare the diameter growth rate potential in West Virginia of the five oaks under consideration. This comparison is based on 10-year d.b.h. (i.b.) growth rates of Vigor I trees. The growth of this vigor class is least affected by competition and most truly expresses growth capacity of the species. Thus, we have in order of decreasing growth rate:

1. Northern red oak
2. Black oak[2]
3. Chestnut and scarlet oaks
4. White oak

It is suggested that the informa-

[2]Brinkman says, "The growth rate of black oak on favorable sites is better than that of white and chestnut oak but not quite as good as that of red oak." (*1*)

tion gathered in this study may be applied in several ways: for estimating growth of the different species on different sites; as an aid in determining the economic-maturity diameter of trees; as a guide in marking when selecting trees to cut or leave.

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DEAN ROSE WILLIAMS, Montana State University School of Forestry, *left center*, is shown presenting an historic gavel to J. Everett Sanderson, newly elected chairman of the Northern Rocky Mountain Section. The gavel has become the symbol of the Section. The names of each chairman since 1912 are preserved under successive coats of varnish. The late Ferdinand A. Silox was the first.

On the left is Donald D. Baldwin, chairman of the Missoula Chapter; on the right Russell Lockhart, chairman of the Libby Chapter. Not shown is Section Vice-Chairman Richard Marks, who was unable to attend this meeting of the Section's Executive Board. The Board met, for the first time since the adoption of new Section bylaws last summer, to discuss Section business, including the formation of new chapters.

Notes and Observations

Fifth World Forestry Congress Background Information

The Fifth World Forestry Congress is to be held on the campus of the University of Washington, Seattle, Wash., August 29 to September 10, 1960. The United States Government is host to this Congress. The Food and Agriculture Organization of the United Nations and other agencies are cooperating in its preparation.

The Fifth World Forestry Congress is being held in the United States as a result of an offer from the United States Government to act as host, made to the Council of the Food and Agriculture Organization of the United Nations at its 26th session in Madrid, 1957. The offer was unanimously accepted from among six offers then before the Council. The Conference later took note of this action; requested the Director-General (Resolution No. 21/57) to give the Organizing Committee established by the United States Government whatever assistance might be requested and appropriate; and called upon all member governments to take the opportunity offered by this Congress to promote better public knowledge and understanding of the role of forestry in national economic and social development.

This is the first such Congress to be held in the Western Hemisphere, previous World Forestry Congresses having been in Rome, Italy, 1926; Budapest, Hungary, 1936; Helsinki, Finland, 1949; and Dehra Dun, India, 1954.

Purpose and Program

The purpose of this Congress, essentially technical in nature, is to advance the science and practice of forestry in its broadest sense by providing an opportunity for the exchange of information and the development of ideas on a broad international scale. In addition it will provide for the development of personal associations between leaders and technicians in forestry on an international basis and stimulate and foster international cooperation in the proper development and use of the world's forest resources, occupying some one-third of the world's total land surface.

Special emphasis will be given to problems of multiple-use of forests and associated lands including not only the production and utilization of wood and wood products, but also provision of forage, conservation of water, and the development of recreational facilities and game.

Provision will also be made for a review of the status of world forestry as of 1960. It is hoped that this feature will be made a part of all future Congresses, thus providing for periodic consideration of forestry development on a world basis.

In addition, the program of the Congress will cover:

Silviculture and Management
Genetics and Tree Improvement
Forest Protection
Forest Economics and Policy
Education
Forest Products
Forest and Range Watersheds
Forest Recreation and Wildlife
Logging and Forest Operations
Tropical Forestry

Under each of these broad headings the program will discuss specific, carefully selected topics of regional and world interest with participation by technical authorities from the forests and forest industry personnel of all world regions. Though the Organizing Committee will invite general papers on topics of worldwide interest from world forestry leaders, any participant will be free to present a special paper on any Congress topic. The official languages of the Congress will be English, French, and Spanish.

Attendance

Though the Congress is an official one, and many countries will name official delegations, participation will be open to any private person or technician interested in forestry, forest conservation, forest recreation and the forest industries, upon application to the Organizing Committee. No invitation will be issued to nor needed by individuals qualified for membership. Application blanks will be circulated at a later date. Some 80 governments within the United Nations family have been invited to attend the Congress. Indications are that the Fifth World Forestry Congress may be the largest ever held with 1,500 to 2,000 participants from 55 to 60 countries.

Congress Plans

All preparations for the Congress have been vested in a 44-man Organizing Committee appointed by the Secretary of State, including representatives from the interested federal departments, forestry schools, forestry associations and societies, conservationists, and forest industrialists. The chief of the United States Forest Service, Dr. Richard E. McArdle, has been named chairman of the Organizing Committee.

The Organizing Committee has delegated detailed preparations to seven working committees: Finance; Program; Tours; Educational Exhibits; Machinery and Equipment Exhibits; Information and Publicity; and Local Arrangements. These activities are under the continuing direction of an Executive Committee, consisting of the chairmen of the committees named, plus key representatives in the Wash-

ington, D. C. area. Some of these committees are quite large; for example there are 44 persons on the Organizing Committee, 79 on the Program Committee, and 66 on the Tours Committee. In all, over 270 American foresters and forest industrialists are now helping in the preparations for the Fifth Congress.

Tours

Although the purpose of this Congress is the exchange of information by the participants on a world basis, obviously forestry activities of the entire United States will be on parade and foreign guests will be offered the opportunity to see such activities. The Organizing Committee is prepared to offer a number of both pre- and post-Congress tours in major forest regions. Each tour will be designed to give visitors as good as possible a cross-section of forestry activities in that region.

Exhibits

Another feature of the Congress will be exhibits of forestry equipment and machinery and other educational materials. The machinery exhibit will include displays and demonstrations of logging and other harvesting equipment, technical forestry equipment, fire fighting equipment, and so on. In addition, an educational materials exhibit is planned to illustrate various forestry activities and programs. It will include a showing of the best forestry films from participating countries.

Information

The Organizing Committee has already arranged for several news items related to the Congress through the facilities of the Department of Agriculture and the Department of State. Some 13,000 to 14,000 copies of a preliminary announcement covering place, date and general character of the Congress, program, etc., have now been distributed in five languages (English, French, German, Russian and Spanish) to a special mailing list of key forestry agencies and institutions throughout the world. The foreign mailing list now contains over 1,800 names; about six times more than any previous list. A more detailed information guide covering method of application for membership, preparation of program papers, program and tour plans, and so on, will be issued in early 1960.

The Information and Publicity Committee also plans an extensive program of general and technical news notes on Congress topics, tours, and preparations, to be released through newspapers and trade and technical journals. The United States Information Agency and the Food and Agriculture Organization of the United Nations, have both promised to assist in such worldwide Congress publicity. They have excellent facilities available to them on a worldwide basis. including press, radio and still and motion picture outlets. The publicity program will include special stamp issues in commemoration of the Congress from the United States as host government, from the United Nations, and perhaps from other participating governments.

Inquiries

Inquiries concerning the Congress may be made to I. T. Haig, Executive Secretary, Organizing Committee, Fifth World Forestry Congress, Department of State, Washington 25, D. C.

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Devices to Measure Spiral Grain and Twisting in Poles

During studies of the relationship between twisting and spiral grain in power transmission and telephone poles, the writer developed a device to measure spiral grain in trees and poles and another to measure angular twisting of upright study poles. Although these are simple instruments, they may be of interest and help to others engaged in studies of spiral grain or twisting.

Figure 1 shows the device for measuring spiral grain. Termed a "bolaxis" by Peter F. Stickney, who built the first model[1] in 1953 under the writer's directions, it determines the axis of the bole. The bolaxis consists of two pairs of legs connected by a frame from which two movable pointers project to bisect the angle between the legs. The legs of each pair are set at an angle to straddle conveniently the material being studied. Legs 20 inches long set at an angle of 60 degrees from each other were found suitable for poles and trees from 4 to 20 inches in diameter. Similar legs of each pair are mounted on the connecting frame so that they are in the same plane. The two movable pointers are also in a common plane. The pointers may be set any convenient distance apart; on models used by the writer and his assistants, sharpened pointers 12 inches long were set 24 inches from point to point.

To use the bolaxis, a strip of bark is peeled from the pole, log, or tree. Direction of grain is determined by inserting the point of a grain detector into the wood and pulling the point along the bole for a convenient distance, thus scratching a mark on the surface and showing the grain of the wood. The bolaxis is placed over the mark with one pointer on the mark. The departure from the other pointer to the mark is then measured. A rule to measure this departure may be calibrated either in degrees or in inches along the stem per inch departure around the stem.

Figure 2 shows the device for measuring angular twisting of upright test poles. For testing, each pole was set vertically and fitted

[1]The first model was made of wood. The model shown in Figure 1 was constructed of steel in 1955 by the J. Neils Lumber Company, Libby, Mont., under the direction of James Trappe, then with the Intermountain Forest and Range Experiment Station.

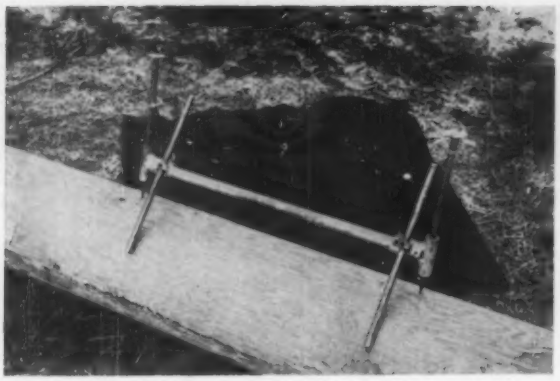

FIG. 1.—Bolaxis used in measuring spiral grain in trees, poles, or logs.

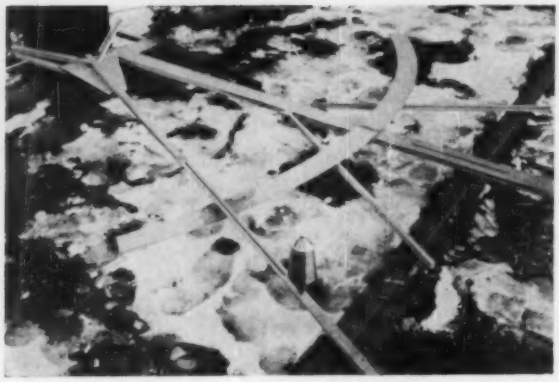

FIG. 2.—Device for measuring twisting of upright test poles.

with an arm extending horizontally from the top. A cord or wire was suspended from this arm at 6 feet from the center of the pole, and a plumb bob was attached to this wire. At the beginning of the test, the position of the vertical plane passing through the arm was marked on a permanently fixed rail. The device illustrated in Figure 2 was used to measure the angular twisting of the arm at the top of the pole from its original position. It consists of a baseboard with a slot in one end which is centered over the original mark on the rail. At the other end of the baseboard a hook is placed in a screweye on the pole, level with the rail. The hook is in the end of a dowel that is free to move in or out of the end of the baseboard. Fixed rigidly to this end of the baseboard are two legs that extend out around the pole. Toward the end of each of these legs is a movable pointer that permits the baseboard to be adjusted so that the pointers are in line with the center of the pole. Out along the baseboard toward the slotted end is a rigidly attached segment of a circle graduated in degrees to both left and right from the center line of the baseboard. This circle is 57.3 inches out from the line connecting the pointers so that each degree on the circle equals 1 inch. Used with the baseboard is a rod forked at one end and slotted at the other.

In use, the baseboard is centered over the original mark on the rail and adjusted for position with respect to the center of the pole. The rod is placed over the baseboard with the fork against the pole. The rod is moved circularly around the pole until it is centered directly under the plumb bob. The angular displacement of the arm at the top of the pole is read through the slot where the rod crosses the graduated circular segment.

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No Serotinous Cones on Central Oregon Lodgepole Pine

Early observers and workers in lodgepole pine (*Pinus contorta* Dougl.) noted its serotinous cone habit, and conclusions as to methods of cutting and regeneration have largely been based on the assumption that some viable seed remains in closed cones for a number of years after they mature. This early work was done chiefly in the central Rocky Mountain region, where lodgepole pine was first used extensively for domestic and commercial purposes (*3*).

Recently, several observers have reported wide variation in the serotinous character of lodgepole pine, both regionally and between trees in the same region. Crossley (*2*) described these variations in detail for individual sample trees of different ages and for open-grown *vs.* stand-grown trees in Alberta, Canada. Critchfield (*1*) included this characteristic in an excellent report on geographic variation of lodgepole pine, covering its entire range . He found that cones of lodgepole pine in its coastal geographic range (with specific exceptions) and in the Sierra Nevada and southern Cascade Range are nonserotinous; that is, the cones normally discharge most of their seeds when mature in the fall and all of them within a year of cone ripening. In the northern Cascades and the Blue Mountains, the habit is variable. Though most cones are nonserotinous, a few trees on which they are serotinous are found scattered through the stand. Trappe and Harris (*4*) also reported this condition for the Blue Mountain region. In the Rocky Mountains and Canada, cones are characteristically serotinous but with many individual exceptions, as pointed out by Crossley.

In the Deschutes-Klamath Basin area of central Oregon, which includes over a million acres of lodge-

pole pine, the writer began a study in 1954 to see if any of the persistent cones were truly serotinous. The area covered in this study includes most of the main body of lodgepole pine on the east slopes of the Cascade Range from the vicinity of Bend, Ore., south to Crater Lake. Elevation ranges from 4,300 to 6,400 feet above sea level. Thirteen specific areas considered representative of this territory were sampled, and general observations of cone conditions were made at many intermediate points. At the 13 sampling points cone-bearing branches were collected from 1 to 3 young trees and 1 to 3 mature trees. On each tree, samples were obtained from the upper and lower crown and from the north and south sides of the crown. Open-grown trees as well as trees in stands were included in the sampling.

No viable seeds were found in cones older than those of the current year. This finding, based upon a more widespread sampling, confirms that of Critchfield for the southern Cascades.

A few wormy or empty seeds were found in parts of cones where the scales had not opened normally or where the seeds were held fast because of cone insect work. As might be expected, the number of cones produced and the persistence of old cones varied widely between individual trees and areas sampled, but variation had no apparent relation to elevation nor to position of cones in the crown. Many trees bore persistent cones in such numbers as to indicate a crop nearly every year, but with occasional years of scarcity or failure. For example, practically no cones were found on sample trees for the years 1950 and 1951.

In the areas studied, cones persist on some trees up to 25 years at least, but the outer cone scales begin to weather and fall off after about 12 years, finally leaving only a stub with the basal scales. Other trees seem to drop their cones within a few years. These conclusions on past cone production and persistence are of course not precise, as some cones may have fallen off or been harvested by squirrels—especially in years of light crops. Persistent cones retain their ability to open and close with successive dry and wet periods for about 8 to 10 years, after which they usually remain open or deteriorate. Thus casual observation during winter or other wet periods may have led some people to believe the closed cones were serotinous.

On October 22, 1954, incidental observations were made to see how much seed had been discharged from the current year's cones. As expected, this varied with elevation. At sampling points up to 5,400 feet nearly all seed had fallen from the cones, whereas at 5,900 feet and above, up to 25 percent of the seed was still in the cones. Seed-trap records at Pringle Falls—elevation 4,300 feet—indicate that in most seasons more than 90 percent of the total seedfall occurs before November 1.

Recognition of this nonserotinous cone habit in the central Oregon region is important in planning cuttings and slash disposal where natural regeneration of lodgepole pine is desired. Foresters must rely largely on a live seed source from reserved trees within or adjacent to the cutting area. However, if cutting is done in the fall or early winter of a good seed year, adequate reproduction usually may be obtained from the current seed crop. In such cases slash treatment must be carefully prescribed or timed so as not to destroy the seed or young seedlings.

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A Wire Method of Marking Trees for Long Term Identification

The Armstrong Forest Company, like others practicing forestry and conducting research, had a need for permanently designating trees for later reference. The problem manifested itself in the company's program of selecting some 50,000 to 100,000 trees a year in its crop tree program.

At first the trees were marked with conventional tree scribes, but this method has several disadvantages: it affords entrance to disease and insect attack, causes difficulty in eliminating the mark when required, and there is confusion with similar marks caused by natural injury. Paint marks were also tried but proved unsatisfactory due to their short life and excessive cost when used on thousands of trees per year. Metal tags when tried soon fell off or were grown over.

In 1956, a section of a tree from an old fence row was brought into the office with a piece of a wire protruding. This suggested that a method of marking crop trees by similarly imbedding a single, upright length of wire in the base of the tree might work. This idea has been developed into a practical solution of the problem. Briefly, the method consists of driving a length of stiff wire about one inch into the root collar area of a tree by using a hammering device made from iron pipe (Fig. 1). The wire stands erect and will continue to be held firm by new wood growth around it (Fig. 2). The cost of this marking method is nominal, the materials are easily obtained, and the work can be performed year round.

The wires, made of round, standard galvanized, hard temper steel are 10 gauge (about the diameter of an 8d common nail). They are precut to 30-inch lengths and average eight wires to the pound. The manufacturer claims at least 30 years' life expectancy. Before use, one end of the wire is hand dipped in yellow paint to permit easier identification in the woods.

The wire driving device is made from two pieces of pipe and a "T" fitting (Fig. 3). A 28½-inch length of ¼-inch galvanized pipe is fastened inside a 28-inch length of ½-inch galvanized pipe with a spot weld. This double thickness gives strength and weight to the device. The tapered end created by the two different lengths of pipe makes it easier to position and bend the wires. The "T" fitting is then added to the threaded end of the larger diameter pipe—the open "T" permits debris to escape and keeps the barrel of the device from clogging. The wires will eventually wear a hole in the "T" fitting but it can easily be replaced.

For convenience in carrying wires, a quiver similar to that used by archers for carrying arrows is employed (Fig. 4). Such a quiver, capable of holding about 100 wires, it made from a 30-inch length of 2½-inch discarded fire hose. A wood plug is used to seal one end. The flexibility of the hose allows the quiver to conform to the wearer's back and helps keep the wires in place. An adjustable canvas strap is attached for a sling.

The best location for insertion of the wire is on a root swell, or in trees with no root swell, as near ground level as possible. For insertion, the wire is slid into the pipe, and the unpainted end is

FIG. 1.—Wire inserting tool in use.

FIG. 2.—Crop tree wire in place.

placed on the desired spot at the base of the tree. With the inserting tool held as near upright as possible, several sliding jabs are made to drive the wire into the sapwood. The tool is then withdrawn. If the inserted wire is very far from a vertical position, it can be bent upright while withdrawing the tool. To prevent loosening the wire, this bend should be made a few inches from the point of insertion. Caution must be exercised while driving the wire to avoid injuring the cambium by excessive hammering with the inserter.

Wires cost about one cent per wire, F.O.B. Pittsburgh foundry, when purchased in quantities of 10,000 pounds or more and are precut to desired length at no extra charge. Painting the wires by hand dipping adds one-half cent to the cost. A man inserts up to 250 wires in an eight-hour day doing the crop tree selection work.

Several advantages are obtained by using the wire method of marking trees. The wire's life far surpasses paint marks and there is no confusion with natural discoloration resembling paint. There is no open wound on the tree if inserting is done carefully. All species can be marked with equal ease, which is quite different than trying to apply paint to such rough barked species as black cherry or when trees are ice coated or rain soaked. The wire is also a convenient place on which to attach metal tags. Of particular advantage is the fact that the wire method can be used year round, even in inclement weather. The upright wires distinctly point out that these are "special" trees.

Since wires were first used in 1956, the only noticeable deleterious effect on the tree is a slight stain streak in the sapwood extending less than 5 inches above the point of insertion. This is well below stump height and should be of no consequence in the butt log. No deterioration of the wire has been reported to date.

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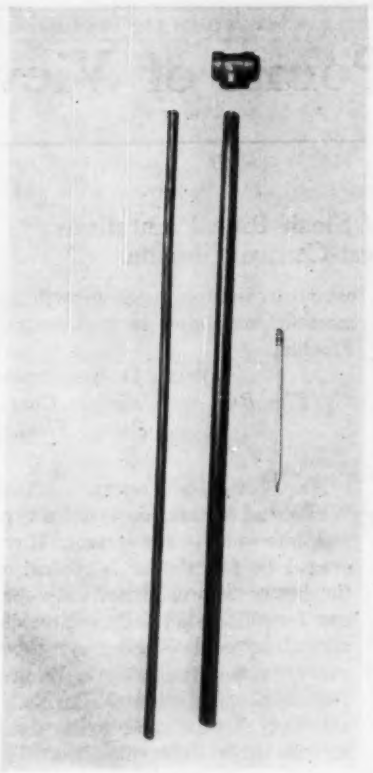

FIG. 3.—Tool disassembled.

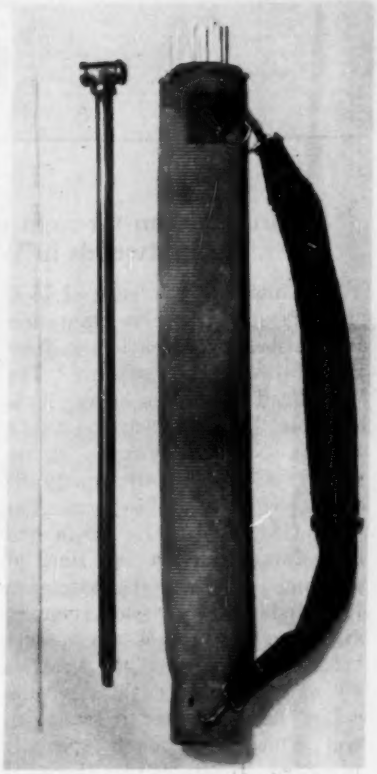

FIG. 4.—Tool assembled with carrying quiver.

Seeks Information

Mr. Kihachiro Sudo of Japan has written to say he would like to correspond with American foresters who have studied the relations of forest stand density to root systems of trees and other plants. Apparently he hopes for a mutually helpful exchange of facts and theories with one or more of our scientists. His address is: Information and Liaison Office, Maibashi Regional Office, Maifashi Eitinkyoka, Ewagomai—Oho, Maibashi, Japan.

Points of View

Comments on Growth of Slash Pine Plantations on Flatwoods in West-Central Florida

It is interesting to read of high yields from a slash pine plantation as described by Arlen in the June 1959 JOURNAL OF FORESTRY.[1] The Whitehead Plantation on the Apalachicola Ranger District of the Florida National Forests is reported to have grown up to 61 cords per acre in 25 years. The plantation is on a site which had been farmed up to the time of planting. In fact, the area was fertilized with barn-yard manure and sown to cow peas the summer before the pine seedlings were set out. Arlen considers this site typical of flatwood sites in west-central Florida, although specially prepared. He states that there are thousands of acres in Florida which can support this type of stand.

This commentator had occasion to visit the Whitehead Plantation recently with two colleagues. The soil profile was checked sufficiently to be able to conclude that this plantation is not on a typical flatwoods site. The soil is much more typical of moderately well-drained soils such as the Blanton series. These soils were cleared for agriculture because they had good drainage. In contrast, flatwoods soils are characterized by poor drainage and are usually of the Leon, Plummer, or other related soil series.

The Whitehead Plantation is on a better than average site. The old settlers knew this when they cleared the land. It is doubtful whether a typical flatwoods site would produce the wood volume described for this plantation, with or without initial fertilization. Investments in drainage will be necessary to simulate such growth on most flatwood sites in west-central Florida.

DONALD D. STEVENSON
The Buckeye Cellulose Corp., Foley, Florida

Mr. Stevenson's comments that Whitehead Plantation is not a typical flatwood site are correct. However, I do feel that it is typical of the better flatwood sites. My reason for this belief is based on observations made during my three years on the Apalachicola Ranger District in west central Florida. I consider the flatwood to be made up of three different sites. The first is comprised of cypress ponds and bays that are usually covered with standing water all year long. The second site is the poorly drained pine areas that usually have standing water part of the year. The third site is the better drained good growing sites. Whitehead Plantation lies in this third group.

Of the 285 thousand acres on the Apalachicola Ranger District, about 80 thousand are in the first classification, 50 thousand acres in the second, and 155 thousand acres in the third. There is usually a rise or drop of only one or two feet between these sites. Thus, even though Whitehead Plantation is not a typical flatwood site, I firmly believe it is typical of the thousands of acres of better drained flatwood sites in west central Florida.

WILLIAM H. ARLEN

[1]Arlen, W. H. Growth of slash pine plantation on flatwoods in west-central Florida. Jour. Forestry 57:436, 1959.

Comments on the Article "Control Techniques for Managed Even-Aged Stands"[1]

Analysis reveals a striking similarity between Wiley's crown diameter procedure and the $(D+X)^2$ method, as to the average spacing of dominant and codominant trees in fully stocked loblolly pine stands, both before and after thinning. Mitchell[2] suggested $(D+4)^2$ as the minimum space tolerated by a dominant loblolly pine, and $(D+6)^2$ as the growing space needed for loblolly pine for a specified period of time. This period between thinnings, or the cutting cycle, would vary, depending upon the site index rating of the soils on which it is growing. Wiley arrived at a similar space requirement based on measuring crown diameters.

As can be seen from Table 1, differences in stocking by the two methods for diameters 9 inches to 17 inches are relatively slight. In field operations these slight differences would not be significant.

Wiley correctly points out that the problem is one of determining the growing space requirements for *individual* trees. This, of course, is necessary to determine what constitutes proper growing stock. He also properly points out some of the distinct advantages of knowing growing space requirements for individual trees, such as: (1) 8-foot spacing for planting loblolly pine,

[1]Wiley, J. J., Jr. Control techniques for managed even-aged stands. Jour. Forestry 57:343-347. 1959.

[2]Mitchell, H. C. Tree diameter as a guide to thinning southern pine. Mimeograph for Technical Review, Soil Conservation Service, U. S. Dept. Agric. 1958.

TABLE 1.—COMPARISON OF NUMBERS OF TREES AND BASAL AREA PER ACRE AT GIVEN D.B.H. BY "CROWN DIAMETER" AND $(D+X)^2$ METHODS, SITE 80 FOR LOBLOLLY PINE

		Full stocking of dominants and codominants				Same stand after thinning and harvest			
		By the D + method		By crown diameter		By the D + method		By crown diameter	
Age	*D.b.h.*	*No. trees*[1]	*Basal area*	*No. trees*	*Basal area*	*No. trees*[2]	*Basal area*	*No. trees*	*Basal area*
10	(5.2)[3]	(515)[3]	(76)	(515)[3]	(76)	(347)	(51)	250	(37)
20	9.4	243	117	250	121	184	89	170	82
30	11.7	177	132	170	127	139	104	137	102
40	13.3	146	141	137	132	117	113	118	114
50	14.5	127	146	118	135	104	119	106	122
60	15.4	116	150	106	137	95	123	97	126
70	16.2	107	153	97	139	88	126	89	127
80	16.9	100	156	89	139	X	X	X	X
Average basal area per acre throughout rotation (Before thinning)		8)1071	134		8)1006 126	(After thinning)	7)725 104		7)710 101

[1] $\frac{43560}{(D+4)^2}$ [2] $\frac{43560}{(D+6)^2}$

Average basal area per acre at mid-cutting cycle:

D + method $\frac{134+104}{2} = 119$ square feet

Crown diameter method $\frac{126+101}{2} = 114$ square feet

[3] Figures in parenthesis are added to Wiley's table to complete the age class groups.

(2) instructions to markers can be brief and precise, (3) more of the marker's attention can be devoted to the better trees to leave and less to the poorer trees to be taken, and (4) the usual patchy condition of natural stands can be smoothed out rather quickly, thus minimizing initial understocking.

The table compares stocking by the two methods in terms of basal area, as well as numbers of trees per acre. It was constructed by using the numbers of trees, diameters, and ages shown in Wiley's Table 1, plus a few approximations to round out the age class distribution. To make the comparison between Wiley's figures and the $(D+X)^2$ method easier, an 80-year rotation, divided into 8 cutting cycles, was used. Both the rotation and the cutting cycle are probably too long for greatest net returns. Also, the resulting basal areas are probably somewhat higher than necessary for optimum returns.

With premises as stated, average basal area per acre at mid-cutting cycle on Site 80 is 114 square feet by Wiley's method and 119 square feet by the $(D+X)^2$ method. Both figures may be higher than desirable due to the long (80-year) rotation. For a 50-year rotation, both methods would maintain an approximate average of 90 square feet of basal area per acre.

Wiley's procedures and the $(D+X)^2$ procedures yield essentially the same results. Each has certain distinct advantages over other methods for use in the field. In choosing one of the two methods, the one having greatest total advantages to the individual should be used.

JOHN E. WIGGINS, JR.
Soil Conservation Service,
Raleigh, N. C.

Cautions on Use of Herbicides

Much has been written about the possibilities of herbicides as a forester's tool, but little has been written about the possible harm that can result from widespread use of such chemicals. Because many foresters seem to believe that no harm can result from such a practice, it is hoped that the following account will serve to alert such individuals to the longer term effects not immediately apparent.

One of the most widely planted trees in North Dakota prior to 1952 was the boxelder (*Acer negundo*). It was branchy, fast growing, aggressive, capable of existing in spite of drouth, grasshoppers, early and late frosts, flooding, and high winds. Considered valueless by lumbermen, it was still a good tree for wind protection. At the present time the old trees are decadent, and boxelder is no longer planted in any significant numbers. Why?

A strange malady[1] appeared on boxelder in 1952 (some say earlier, some later). About the middle of July the terminal leaves became chlorotic, cupped, small, and deformed. Each subsequent year the same symptoms have appeared but progressively earlier in the season until now they appear in early June. Many trees are dead, height growth has practically ceased on the survivors, the crowns are liberally sprinkled with dead twigs and the trees have become "leggy," practically barren of leaves for a considerable distance above the ground.

The terms "Boxelder Blight" and "Fernleaf Symptom of Boxelder" were first used to describe the malady and it was thought that an insect or a virus must be the causal agency. A twig borer was epidemic about 1956 and was thought to be a possible explanation, but when the borer lapsed into endemic numbers in 1957 and the symptom persisted, a virus was given top attention. Similar symptoms found on hackberry, Siberian elm, American elm, staghorn sumac, wild grape, and paper birch in 1957 tended to contradict the assumption of a virus as being the causal agency, because rarely will a virus attack such a wide range of species.

In 1958 a drouth in the northwestern tier of North Dakota became so severe that neither weeds nor grain promised to do more than prevent soil blowing. Farmers in the drouth area refrained from spraying their fields with 2-4-D for weed control. Good spring moisture in other parts of the state encouraged weed growth and 2-4-D was applied in the usual amounts by both aerial and ground equipment. Strangely "Boxelder Blight" was severe in the moist area but very light in the drouth area.

Formal proof that biocides are the cause of "Boxelder Blight" has not yet been made but the writer is certain in his own mind that only 2-4-D spraying could account for the "Blight." The first symptoms of damage appeared at the time when spraying fields with 2-4-D for weed control became a standard practice. The progressively earlier appearance of symptoms correlates well with recommendations to spray earlier when weeds are small. Laboratory studies add further evidence to the theory that 2-4-D is the causal agent.

Many foresters will say: "Boxelder is a weed tree. Other trees can be used for shelterbelts."

The important point is that boxelder is the one species on which the symptoms of damage can be seen the most easily; it is not the only tree affected but may be the only one showing symptoms the casual observer will detect. A study, by the writer, of cores extracted with an increment borer disclosed that diameter growth on boxelder, Siberian elm, Russian olive, and green ash had been drastically reduced in years subsequent to 1952. Red cedar, Black Hills spruce, Scotch pine, and ponderosa pine showed no comparable reduction in diameter growth over the same period. The Russian olive showed no external symptoms of physiological damage, the green ash very little, and the elms so little that the casual observer would not notice the danger signs.

A recent trip to Wisconsin disclosed that all boxelder exhibited symptoms, wild grape in one of the nurseries was definitely affected, and the crowns of sugar maple and even eastern white pine looked suspicious. A colleague noted severely affected black locust. The problem may be more serious and widespread than foresters think. The writer is of the opinion that unless there is a change in the use of chemicals in North Dakota, no tree planting made subsequent to World War II will attain the height predicted for the species and that no tree planting made subsequent to 1951 will achieve crown closure. Do similar conditions exist elsewhere?

All foresters can recognize spray damage caused by such high concentrations that the foliage is burned or the trees die. Few can recognize the symptoms of low concentrations that will merely reduce growth rates, however, so the symptoms, only one of which may be present on a particular tree, are listed below.

1. Terminal leaves in upper crown small, chlorotic, malformed, and often bunched. The leaves of Siberian elm and American elm have a dark green margin.
2. Many small dead twigs in the crown.
3. Premature death of lower branches resulting in "leggy" trees.
4. Sparse foliage.
5. A definite upward sweep of the uppermost lateral branches, giving the appearance of a rounded top.

Insects, fungi, and fire all receive a considerable amount of attention. Herbicides may be a wolf in sheep's clothing, and foresters should be quipped to recognize the danger if it truly exists as seriously as North Dakota evidence would indicate.

JOHN M. MOLBERG
Deputy state forester,
North Dakota Forest Service,
Bottineau

[1]Beckworth, L. C., and R. L. Anderson. Boxelder blight a problem in the northern plains states. Lake States Forest Expt. Sta. Tech. Note 482. 1957.

Book Reviews

The Forest Ranger

By Herbert Kaufman. 259 pp. Published for Resources for the Future, Inc. by The Johns Hopkins Press, Baltimore, Md. 1960. $5.

During its eight years of existence Resources for the Future, Inc., financed by The Ford Foundation, has made notable contributions to our knowledge of America's natural resources. Among these contributions has been a series of books that have focused attention on critical issues and discussed the policies that might logically govern the application of management practices.

Forestry has been particularly benefitted by the foundation's nine major publications. All but two have been concerned with renewable resources and the soil and water that support them. This latest book is one for which the Forest Service, and the forestry profession, should long be grateful.

Subtitled *A Study in Administrative Behavior, The Forest Ranger* is essentially a dissection of the body of the U. S. Forest Service. It examines—critically yet with intelligent understanding—the structure of the Service, and the activities of the field personnel—the men on the ground—who translate policy into action.

Never, in my recollection of the literature of forestry during the past four decades, has the United States forest ranger been so analytically evaluated. He emerges as a man of character and ability; a technologist, in short, educated and trained as custodian and manager of some of America's most valuable resources, and doing a creditable job of it.

Because the subject of this remarkable book is first of all a professional man, he belongs not alone to the Forest Service but also to the profession of forestry in America. Thus, our profession may share with the Forest Service a certain feeling of pride that the ranger has been accorded the honor of this study.

As a former member and longtime friend of the Forest Service, I have for years realized that during its history it developed certain characteristics that inspire both high morale among its personnel and loyalty among its friends. But not until Dr. Kaufman, with a background of research in government administration, applied the techniques of social science to the matter did I quite understand what makes the Service tick. To any one desiring to find out, this book is recommended reading.

As Dr. Kaufman shows, perhaps the single most important attribute that has contributed to the success of the Forest Service is the two-way flow of ideas and suggestions from below to the top, as well as from the top to the ground. To be sure, the ranger is primarily one who executes policy rather than one who makes it, but, to an extent that an outsider might not realize, the ranger too helps mold policy.

HENRY CLEPPER

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California Government and Forestry

By C. Raymond Clar. 623 pp. Illus. Division of Forestry, Department of Natural Resources, State of California, Sacramento. 1959. $6.[1]

In California, the development of a permanent and stable state forestry program was a long and complicated business. More than sixty years elapsed between establishment of the first Board of Forestry in 1885 and the reorganization of the state government which, at long last, in 1927 provided a Department of Natural Resources charged with executing a broad forestry program under an administrative head reporting directly to the Governor. *California Government and Forestry* presents the first complete and detailed legislative history of the growth of forestry in the state during six decades.

The book begins with interesting chapters on the pre-history of California forestry from the Spanish period to the work of the Lake Bigler Forestry Commission. Then it plunges into a definitively comprehensive account of the development of forestry legislation as it emerged in three principal stages: that of the first Board of Forestry (1885-1905) whose initial successes proved abortive; a second period (1905-1919) marked by permanent growth and reflecting both the activities of a more strongly organized Board of Forestry and the influence of the early state foresters, E. T. Allen, G. B. Lull, and G. M. Homans; and a third era (1919-1927) which showed substantial accomplishments in protection and taxation policies and culminated in governmental reorganization establishing the Department of Natural Resources with a Division of Forestry within it.

In the author's own words *California Government and Forestry* is "essentially a history of government . . . (analyzing) numerous bills and laws as to their reason for being, their meaning, and subsequent effect." With exceptional diligence, he has tracked down all available sources of fact and he tells his story with meticulous attention to historical detail. Future students of California forest history and policy will be forever indebted to Ray Clar both for the

[1]Includes postage. Add 24¢ sales tax for books delivered within California.

vast amount of information which his book makes readily available and for the range of source materials which his research has placed within their reach.

But this is more than a legislative history. The men behind the laws are continually in evidence, and the reader learns much about the influence of such classic figures in California forestry as Abbot Kinney and Governor George C. Pardee. Short biographical sketches of more than a score of the principals add both useful information and human interest to the story. The summaries of many important but little known state documents and reports provide a new resource for both students and administrators.

The central concern of the book is, of course, the development of an adequate system of protection against fire. The unlikely team of watershed protection interests in the South and timberland owners in the North was the principal source of political energy for constructing the forest protection program. But the story illustrates again how important for effective political action are the efforts of a relatively few energetic and devoted individuals. In the course of development of the major theme, many fascinating secondary ones also receive attention: the growth of state federal cooperation, beginning with the Joint Survey of the Forest Situation in 1903 (surely one of the earliest applications of the "match money" principle to forestry affairs); responsibility of the early Boards of Forestry for management of certain state parks, until this involvement was terminated by the Reorganization Act of 1927; the "light burning" controversy; and the eucalyptus promotion, to name only a few.

C. Raymond Clar has been a member of the California Division of Forestry staff from 1927 to the present. From 1941 to 1953 he was chief deputy state forester. Currently he is assistant executive officer for the State Board of Forestry. Clar combines this background with an evident historian's instinct. The result is monograph, certain to prove invaluable, written by a man with unique qualifications for doing this particular job.

The very thoroughness with which Clar met the challenge of providing the historical facts posed problems of sequence, continuity, perspective, and interpretation. If he has not fully solved these problems in the present book, this should not obscure the fact that *California Government and Forestry* presents for the first time the broad and indestructible foundation on which sound perspective and interpretation must be built. As such, this book is now an essential reference for every forester in California, and for every student of public forest policy. These and other readers will be grateful for the extensive index and for the lucid type-face and format provided by the California State Printing Office.

HENRY J. VAUX
University of California, Berkeley

Publications of Interest

Research in Southern Forestry, prepared by E. L. Demmon, is a report to The Regional Committee on Forestry Education and Research of the Southern Regional Education Board. Purpose of the report is to summarize the present status of research efforts by public agencies, schools, and industries, and to suggest needed fields of effort and means of coordination.

* * *

The continuing scientific study of wood utilization carried on at the Forest Products Laboratory is featured in a new film, *At Home With Wood,* recently produced in color by the Forest Service, U. S. Department of Agriculture.

The film shows how research work conducted at the laboratory leads to new and improved uses for wood and wood products found in American homes.

The film is available to all interested groups on a free rental basis merely by contacting the nearest Regional Forester of the Forest Service or the Director, Forest Products Laboratory, Madison 5, Wis.

* * *

Based on the National Register of Scientific and Technical Personnel, 1954-1955, the National Science Foundation has recently (1959) published in *American Science Manpower* some 48 pages of employment information —mostly of a statistical character. Of the 116,000 employed scientists on the register, 3,921 were in forestry and of these the largest group reporting (about 40 percent) was employed by the federal government. Private industry employees were second with about 32 percent. Of the total number of foresters by far the largest group specialized in management and administration. Nearly one-third of the foresters have carried their education beyond that required for the bachelor's degree. Salaries are not broken out separately for foresters, but the median annual salary in 1954-1955, for all scientists reporting the item, was $6,525. In general salaries were higher for scientists with a doctorate and those employed in private industry.

* * *

Relationship of Ruffed Grouse to Forest Cover Types in Wisconsin is Technical Bulletin No. 18 of the Wisconsin Conservation Department. The bulletin, by Robert S. Dorney, describes grouse use in relation to forest cover and makes recommendations as to how individual types may be managed so as to encourage grouse. 32 pages.

* * *

In order to report on some of the work completed or in progress at the Ford Forestry Center, the Michigan College of Mining and Technology, Houghton, is inaugurating a new series of publications designated as "Technical Bulletins." As an initial effort, the series will at first cover both technical and non-technical reports. Results of major research, however, will continue to be published in the already established series of Michigan Tech. research bulletins.

Current Literature

Compiled by MARTHA MEELIG, *Librarian, State University College of Forestry at Syracuse University. Range Management Section Compiled by* NELLIE G. LARSON, *Library, U. S. Department of Agriculture*

General

Les Forêts du Sud des États-Unis et Leur Influence sur l'Industrie Forestière du Quebec. By Omer Lussier and Georges Maheux. 23 pp. Laval Univ. Forest Research Foundation, Quebec. 1959.

Log Jam. By L. T. White. 284 pp. Doubleday, New York. 1959. $3.95.

The Next One Hundred Years in Forestry; Proceedings of the Forestry Centennial Conference. Oregon State College, Corvallis. February, 1959. 67 pp.

Strangers in the Forest. By Carol Brink. 354 pp. Macmillan, New York. 1959. $4.25.

Forest Economics

Fundamentals of Forestry Economics. By W. A. Duerr. 565 pp. McGraw-Hill, New York. 1960. About $10.

Forest Products

The Demand and Price Situation for Forest Products (Prepared for Outlook Conference). 33 pp. Charts, tables. U. S. Dept. of Agric. Forest Serv. and Commodity Stabilization Serv. Nov., 1959.

Marketing Sawtimber and Pulpwood. By R. T. Britt and J. A. Martin. 28 pp. Univ. of Tennessee Agric. Expt. Sta., Knoxville. 1959. Bul. No. 295.

Forest Resources

Forest Inventory Statistics for Bledsoe County, Tennessee. 16 pp. TVA, Norris. 1959. For. Bul. No. 74.

Forest Inventory Statistics for Hawkins County, Tennessee. 16 pp. TVA, Norris. 1959. For. Bul. No. 67.

Forest Inventory Statistics for Henderson County, Tennessee. 16 pp. TVA, Norris. 1959. For. Bul. No. 70.

A Study of the Natural Resources of Mahnomen County. 47 pp. Illus. Tables. Minnesota Dept. of Conservation. 1959.

Logging and Milling

What Is Seasoned Timber? 7 pp. Illus. Div. of Wood Tech. Forestry Commission of New South Wales, 96 Harrington St., Sydney, Australia. 1959. Pamphlet No. 7.

Sawmilling in the Tropics. By F. Cermak. 55 pp. Illus. Forest Research Institute, Bogor, Indonesia. 1958. Communication No. 66.

Pathology

Absorption and Translocation of Solutions by Healthy and Wilt-Diseased Red Oaks. By George Yelenosky and C. L. Fergus. 17 pp. Illus. Pennsylvania State Univ. Agric. Expt. Sta., University Park. 1959. Bul. No. 657.

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Protection

Gypsy Moth. By P. B. Dowden and H. L. Blaisdell. 4 pp. Illus. U. S. Dept. of Agric. Forest Serv., Washington 25, D. C. 1959. Forest Pest Leaflet No. 41. 5 cents (Govt. Print. Off.).

A List of Insect Pests of Forest Plants in India and the Adjacent Countries. By G. D. Bhasin, M. L. Roonwal and Balwant Singh. 126 pp. Manager of Publ., Delhi, India. 1958. Indian Forest Bul. No. 171. 7s.

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The Pitch Pine Tip Moth and Its Occurrence in Ohio. By W. E. Miller and R. B. Neiswander. 23 pp. Ohio Agric. Expt. Sta., Wooster. 1959. Res. Bul. No. 840.

Reducing Douglas-Fir Beetle Damage—How It can Be Done. By M. M. Furniss. 6 pp. Illus. Intermountain Forest and Range Expt. Sta., Ogden, Utah. 1959. Res. Note No. 70.

Range Management

Bitterbrush Ecology—Some Recent Findings. By E. C. Nord. 8 pp. Pacific Southwest Forest and Range Expt. Sta., Berkeley, Calif. 1959. Res. Note No. 148.

Control of Mesquite on Grazing Lands. By C. E. Fischer and Others. 24 pp. Illus. Texas Agric. Expt. Sta., College Station. 1959. Bul. No. 935.

Estimating the Utilization of Crested Wheatgrass from Counts of Grazed Plants. By H. W. Springfield. 6 pp. Illus. Rocky Mountain Forest and Range Expt. Sta., Fort Collins, Colo. 1959. Res. Note No. 38.

Handbook—Chemical Control of Range Weeds. By D. R. Cornelius and Others. 42 pp. U. S. Dept. of Agric. and U. S. Dept. of Interior, Range Seeding Equipment Committee, Washington, D. C. Revised ed. 1959. $1 (Govt. Print. Off.).

The Pronghorn Antelope—Its Range Use and Food Habits in Central Montana with Special Reference to Wheat. By G. F. Cole and B. T. Wilkins. 39 pp. Illus. Montana Fish and Game Dept., Helena. 1958. Tech. Bul. No. 2.

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Assessment of Wood Qualities for Tree Breeding. I. In *Pinus elliottii* var. *elliottii* from Queensland. By H. E. Dadswell and J. W. P. Nicholls. 16 pp. Illus. Commonwealth Sci. & Indus. Res. Org., Melbourne, Australia. 1959. Div. of For. Prod. Technological Paper No. 4.

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Some Physical and Mechanical Properties of Noble Fir. By B. H. Paul, A. W. Dohr and J. T. Drow. 14 pp. Tables. U. S. Forest Products Lab., Madison, Wis. 1959. Rept. No. 2168.

Wood Industries Conference Technical Papers September 10-11-12, 1959 Multnomah Hotel, Portland, Oregon. 235 pp. Illus. Available from E. H. Clarke, Financial Chairman, 2333 NE 25th St., Portland 12. $3.

New D6 Series B

93 HP Flywheel — 19,495 lb. Max. drawbar pull

Cat D333 6-cylinder Diesel Engine

5 speeds forward, 4 reverse

Operating weight, 18,280 lb. (74″ gauge)

RUGGED MATCHED ATTACHMENTS for the D6 and D4 include Bulldozers, Tool Bar, Scraper, Rock Rakes, Winches, K/G Blade, Rippers and others.

New D4 Series C

65 HP Flywheel — 13,000 lb. Max. drawbar pull

Cat D330 4-cylinder Diesel Engine

5 speeds forward, 4 reverse

Operating weight, 11,710 lb. (60″ gauge)

IMPROVED STARTING ENGINE for both tractors has recoil starter for fast starts. Also 12-volt in-seat starting available. 24-volt direct electric starting optional.

CATERPILLAR ANNOUNCES the

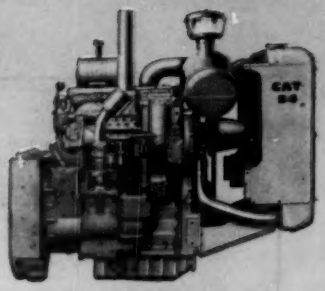
completely redesigned for faster and greater production

There's no time like now to upgrade your equipment spread. These two new tractors not only look different—they are different. Each, in its own class, answers your needs for higher production and greater operating economy. Some of their important new features are described on these pages. In addition to these improvements, each machine provides other famous Caterpillar features... the dry-type air cleaner,

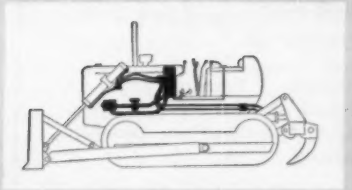
D6 93 HP 6-cylinder Engine
Maximum drawbar pull, 19,495 lb. The D333 Engine provides power with dependability for a long life of economical operation.

New Caterpillar Diesel Engines deliver 25% more lugging ability

For the D6 and D4, two completely new Cat Diesel Engines. 25% more lugging ability. New compactness with new ruggedness. Famous Cat fuel injection pumps in new, easily serviceable housing. New direct acting governor that makes quick fuel adjustments, picks up loads fast. New, improved gasoline starting engine.



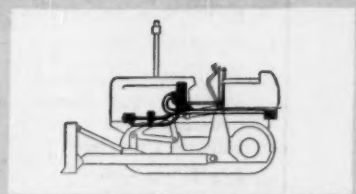
D4 65 HP 4-cylinder Engine
Maximum drawbar pull, 13,000 lb. New design of the D330 results in smooth, vibration-free performance in all speed ranges.



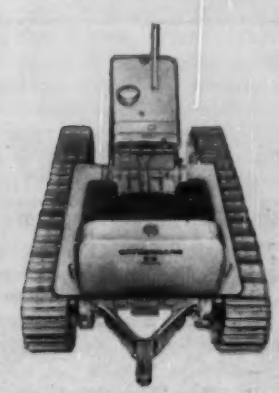
D6 Integral Hydraulic System
No. 165 Hydraulic Control for bulldozer
54 GPM Pump—1500 PSI
No. 143 Hydraulic Control for No. 6 Tool Bar
29 GPM Pump—1700 PSI

New integral hydraulic systems put more power where you need it

More work power at the tools—that's one of the big advantages of these new Cat hydraulic systems. Under-the-hood mounting of tank, pump and valves permits convenient routing of hydraulic lines to bulldozer or implement cylinders, frees front and rear for mounted equipment. Center-pivoted cylinder mounting on D6 gives increased blade lift/drop range for greater production. Hydraulic control system provides hand control for bulldozer and/or ripper, foot control for tilt cylinder on D6.



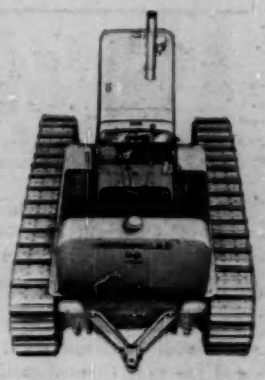
D4 Integral Hydraulic System
No. 143 Hydraulic Control with:
29 GPM Pump—1700 PSI for bulldozers
17 GPM Pump—1700 PSI for tool bars



D6 operator's compartment

New operator convenience and comfort in co-ordinated compartments

The cockpits are all new. Controls are co-ordinated to make one motion flow into the next, reducing hand movements and speeding every operation. Forward-reverse lever (new on the D4) is next to the operator's right hand to speed 'dozer cycle times. Short-travel transmission speed selector shifts gears easily, quickly. Boosters for steering clutches save muscles . . . increase efficiency.



D4 operator's compartment

New D4 Series C and D6 Series B Tractors

hydraulic track adjusters, lifetime lubricated track rollers, the oil clutch, the forward-reverse lever. Your Caterpillar Dealer will be happy to give you the complete facts about both the new D6 and the new D4 and demonstrate them on any of your jobs. The tougher, the better.

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BORN OF RESEARCH
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Society Affairs

Officers and Council
1960-1961

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Report of Council Meeting

A meeting of the Council of the Society of American Foresters was held November 15 and 18, 1959 in the Sheraton-Palace Hotel, San Francisco, Calif.

Present were President G. A. Garratt, Vice President H. J. Malsberger, and the nine Council members: B. E. Allen, P. A. Briegleb, D. E. Clark, C. A. Connaughton, K. P. Davis, M. K. Goddard, W. D. Hagenstein, J. H. Stone, and H. J. Vaux, together with Henry Clepper, executive secretary.

Forthcoming Annual Meetings

On a motion by Dr. Goddard, seconded by Mr. Stone, the Council unanimously voted to hold the 1963 annual meeting in Boston, Mass. The dates are October 20-23.

On a motion by Mr. Briegleb, seconded by Mr. Hagenstein, the Council unanimously voted to hold the 1964 annual meeting in Spokane, Wash. The dates are October 11-14.

Annual meetings have been definitely scheduled as follows:

1960—Washington, D. C. November 13-16. Sixtieth anniversary meeting. Sheraton Park Hotel.

1961—Minneapolis, Minn. October 8-11. Joint meeting with the Canadian Institute of Forestry. Leamington Hotel.

1962—Atlanta, Ga. October 21-24. Dinkler Plaza Hotel.

1963—Boston, Mass. October 20-23. Statler Hilton Hotel.

1964—Spokane, Wash. October 11-14. Davenport Hotel.

Committees for 1960 Meeting

On a motion by Mr. Briegleb, seconded by Mr. Stone, the Council unanimously voted to invite the following members to serve as committee chairmen for the 1960 annual meeting.

General chairman, Arthur W. Greeley.

Program chairman, John F. Shanklin.

Chairman of arrangements, Horace R. Josephson.

Banquet chairman, Tom Gill.

Visiting Scientists Program

The National Science Foundation, Washington, D. C., administers several programs for education in the sciences. One of these is the Visiting Scientists Program, described by NSF as follows:

"This program facilitates visits by distinguished scientists to colleges and small universities for periods of several days to give lectures, to conduct classes and seminars if desired, and to meet students, faculty members, and administrative officers on an informal as well as a formal basis in order to stimulate interest in science. The program is administered through grants to the appropriate professional scientific societies."

On a motion by Dr. Vaux, seconded by Mr. Hagenstein, the Council unanimously authorized the President of the Society of American Foresters to request from the National Science Foundation a grant providing for participation of schools of forestry in the NSF program for visiting scientists.

Proposed Division of Forest Fire Science

Article XII of the Constitution provides for subject Divisions, as follows:

"Subject Divisions of the Society may be authorized by the Council upon the written petition of twenty or more voting members of the Society engaged in the special field of forestry to which the Division pertains, at least five of whom shall be Members or Fellows of the Society. Subject Divisions shall be organized only as the Council is convinced of their need, and they shall be regulated through bylaws established by the Council."

A petition, signed by 134 members, was presented to the Council requesting authorization for a subject Division of Forest Fire Science.

At the present time there are nine subject Divisions in existence: Economics and Policy, Education, Forest Management, Forest Products, Forest Recreation, Forest-Wildlife Management, Range Management, Watershed Management, and Silviculture.

On a motion by Mr. Clark, seconded by Mr. Stone, the Council unanimously instructed the President to appoint a temporary Committee on Forest Fire Science to consider the proposal for establishment of a Division of Forest Fire Science, to study other possible means of encouraging the development of forest fire science, and to recommend to the Council not later than its fall 1960 meeting the steps which should be taken to give appropriate emphasis to forest fire science in the programs of meetings and in other Society activities.

Budget for 1960

The Society's proposed budget for the fiscal year 1960 (December 1, 1959 through November 30, 1960) was discussed by Miss L. Audrey Warren, business manager.

On a motion by Mr. Allen, seconded by Mr. Briegleb, the budget, as presented in Table 1, was unanimously approved.

Financial Reporting

There follow the recommendations of an *ad hoc* Committee of the Council on Financial Reporting.

General: Officers and members of the Council must have systematic financial reports at their meetings so that they can adequately discharge their responsibilities. Such reports should be sufficiently itemized and grouped by significant categories to give officers and Council members a clear grasp of the financial affairs of the Society. At the same time, nonessential detail should not be requested that will place an undue accounting burden on the Society office. Reports should be so framed as to be of utility to the Executive Secretary and staff and in so far as practicable follow normal office procedures in financial matters.

Reporting Schedule Recommended: 1. The Council should have quarterly reports of operating incomes and expenses and balances of investment and other individual funds. Council members need to keep in mind that a municipal-type of accounting is followed with income unequally distributed through the year which inflates the cash position in the first and second quarters in relation to the third and especially fourth quarter. Footnotes or other explanation should be added as needed to make this situation clear.

2. At the spring meeting, the Council should have:

A. First quarter report.
B. Report for the past fiscal year in same general form as quarterly reports.
C. Auditor's report together with footnotes and other notations by the Business Manager as may be needed to explain items.
D. A separate income and expense accounting for the JOURNAL OF FORESTRY. This should include a breakdown of subscriptions and a calculation of annual cost per subscription. Similar separate statements may be made for *Forest Science* or other ventures as appropriate.

3. At the fall meeting, the Council should have:

A. Third quarterly report including the first three quarters of the fiscal year.
B. The proposed budget for the coming fiscal year.

It is also recommended: 1. At the seating of each newly elected Council, the incoming President should appoint a two-man Finance Committee. This committee should study the financial affairs and status of the Society, and report to the Council as a whole.

2. At all Council meetings, copies of all financial reports should be available (with perhaps the exception of the Auditor's Report) for all members of the Council.

Quarterly Report Forms: A suggested quarterly report form is requested. Its exact form and both the grouping and specification of individual reporting items should be worked out by the Business Manager in consultation with the Executive Secretary.

B. E. ALLEN
KENNETH P. DAVIS

TABLE 1.—INCOME, EXPENSE, AND BUDGET (1959 AND 1960)

	Budget 1959	Budget 1960
INCOME		
Dues	$119,000	$124,000
Fees	1,200	1,200
Subscriptions and sales	10,000	12,000
Advertising	43,000	43,000
Miscellaneous income	3,000	3,000
Forestry Terminology	750	500
Miscellaneous Society publications	900	1,000
Forestry Handbook	2,500	2,000
Interest and dividends	2,800	3,200
	$133,150	$189,900
EXPENSE		
JOURNAL OF FORESTRY	$ 52,600	$ 55,000[1]
Editor's expense	1,200	1,200
Salaries, editorial	18,900	19,450
Salaries, executive office	53,700	55,075
Advertising commission	9,850	9,850
Advertising promotion and expense	4,500	4,500
Travel, officers	4,500	4,500
Postage	3,000	3,400
Telephone and telegraph	900	1,000
Rent	7,308	7,308
Multigraphing and mimeographing	700	700
Miscellaneous printing	1,400	1,500
Office supplies	1,500	1,600
General expense	1,500	1,600
Depreciation	1,750	1,850
Retirement plan	2,275	2,275
Dues paid to affiliated organizations	360	360
World Forestry Congress contribution	—	100
Committee expense	100	100
Division expense	100	100
Grading schools	600	600
Council travel	1,200	2,000
Social Security tax	1,540	1,540
Election of Officers and Fellows	850	—
Maintenance of equipment	550	600
Proceedings	1,000	1,000
Miscellaneous	500	500
	$172,383	$177,708
Estimated net earnings	$ 11,767	$ 12,192

[1]Including three special issues: Watershed Management; World Forestry Congress; SAF 60th Anniversary.

On a motion by Mr. Hagenstein, seconded by Mr. Clark, the Council unanimously approved the foregoing recommendations.

At the second meeting of the Council on November 18, the Finance Committee (B. E. Allen and K. P. Davis) submitted the following recommendations, which on a motion by Mr. Stone, seconded by Dr. Vaux, were unanimously approved.

The Committee on Finance recommends:

1. Inclusion as a part of the Auditor's Report annually, a recapitulation of the status of the bonds bought for the retirement of certain employees, showing
   - *A.* The cost to the Society (total from inception of the plan).
   - *B.* The cost paid by the employee for the same period.
   - *C.* Evidence that none of the bonds has been cashed since origination of the plan.
   - *D.* Statement as to where the bonds are kept.
2. Specific direction to the Executive Secretary to purchase theft insurance to cover the monetary intake at a national meeting.
3. A separate statement and accounting of income and outgo at the national meetings.
4. Sufficient copies of the Auditor's annual report for the Finance committee to have permanently.

Hospital-Medical Service

On a motion by Mr. Connaughton, seconded by Dr. Davis, the Executive Secretary and Business Manager were instructed by the Council to study the feasibility of a hospital-medical service program for the Society's employees, and to report to the Finance Committee.

Study of Professional Income of Foresters

At its meeting held April 6 and 7, 1959, the Council authorized appointment of a committee to explore the possibilities of a study of the professional income of foresters.

Named to the committee were Paul M. Dunn, chairman; F. H. Eyre, R. D. Hodges, Jr., C. K. Lyman, and W. W. Ward.

The report of the committee follows:

The committee to explore the professional income of foresters appointed on June 16 held one meeting in Washington and subsequently carried out various assignments.

There was general agreement that a salary survey would be desirable and that it would advance the profession. Helpful information would be provided prospective foresters in comparing salary scales with those of other professions. Foresters in general should find the data useful in measuring their rate of progress in the profession, and employers would be provided information useful in recruitment and in establishing salary standards.

The employer-summary type of survey carried out successfully for engineers by the Engineering Manpower Commission was not believed to be suitable for the SAF because of the likelihood of a poor return from the considerable number of industrial concerns that employ a small number of foresters and do not maintain personnel offices.

Instead, it was the consensus that a survey based on an anonymous individual questionnaire to be sent to SAF members, and adapted to IBM tabulation, would give best results.

A question of coordination with the salary survey undertaken by Dr. Evert Johnson, assistant director of the education, study has arisen. Dr. Johnson made a postal card survey of 10 percent of the 1956 membership (100 percent in the case of teachers) to determine 1958 income. Returns are now undergoing analysis, but publication will be delayed until 1960 or early 1961, according to Dr. Johnson. This survey is considerably less comprehensive than the one we propose. Dr. Johnson writes: "I would not be surprised if we discard our study in favor of yours." If we go ahead with our study, we should explain in the publicity that it should not be confused with the spot salary survey undertaken by the education study.

In summary then, the Committee recommends:

1. That a survey to determine the 1959 professional income of foresters be made in 1960.
2. That the survey be conducted by means of an anonymous questionnaire to be sent to Junior Members, Affiliate Members, Members, and Fellows.
3. That the survey be publicized through the JOURNAL OF FORESTRY and Section meetings in order to assure a good return of the forms.
4. That the returns be tabulated by IBM procedure, analyzed, and interpreted in the Society's office, for Committee approval.
5. That the results be published in the JOURNAL OF FORESTRY.

The cost of such a survey is estimated to be approximately $2,050.

On a motion by Mr. Briegleb, seconded by Mr. Allen, the Council unanimously approved the recommendations of the foregoing committee report.

Directory of Members

On a motion by Dr. Vaux, seconded by Mr. Hagenstein, the Council unanimously voted that, in view of the heavy work load of special projects authorized in 1960, work on a directory of members be suspended and that the estimated costs of a directory be presented to the Council at its spring meeting in 1960.

1960 Membership Goal

The year 1960 will be the Society's 60th anniversary year which will be celebrated at the annual meeting in Washington, D. C., November 13-16.

On the proposal by the Council Committee on Membership, and on a motion by Dr. Vaux, seconded by Mr. Allen, the Council unanimously endorsed a goal of 14,000 members by the time of the 1960 meeting.

Affiliate Membership, Class A

Bylaw 5 sets forth the basic requirement for the Affiliate Member grade, as follows:

Training in forestry, or in related fields in wildland management or forest utilization, but of insufficient quantity to meet the requirements of the Junior Member grade, is the basic requirement.

Bylaw 5 then provides for admission to the Affiliate Member grade through three different classes of qualified applicants.

The first is Class A, as follows:

Class A. Graduates of institutions which offer forestry curricula, but which have not been accredited by the Council of the Society, shall be eligible provided their instruction has included not less than one 3 quarter-credit course in each of the following subjects: silviculture, forest management, forest protection, forest economics, and wood utilization.

On a motion by Mr. Clark, seconded by Mr. Stone, the Council unanimously voted to amend Bylaw 5, Class A, effective December 31, 1960, as follows (the added clause is in italics):

Class A. Graduates of institutions which offer forestry curricula *and which have at least the equivalent of five full time forestry instructors*, but which have not been accredited by the Council of the Society, shall be eligible provided their instruction has included not less than one 3 quarter-credit course in each of the following subjects: silviculture, forest management, forest protection, forest economics, and wood utilization.

This amendment means that after December 31, 1960 applications for Affiliate Membership will not be accepted from forestry graduates of non-accredited schools that have less than five (or the equivalent of five) professional foresters on the teaching faculty.

Affiliate Membership, Class B

Bylaw 5, Class B, provides for the admission to Affiliate Membership of persons who have qualifying practical experience in forestry, or who have a combination of practical experience and education.

Class B is as follows:

Class B. Persons who have had at least six years of practical training, or a combination of practical and theoretical training equalling at least six years, shall be eligible. Each academic term of appropriate theoretical training at

ranger, vocational, or professional forestry schools may be substituted for one year of practical training up to a maximum of two years. Qualifying forestry experience, which may be considered as meeting the practical training requirements, shall be obtained while the applicant is regularly engaged in growing forests, with attendant duties such as management or protection of forest areas, supervision of silvicultural requirements in logging, erosion control, or similar forestry activities; regularly engaged in related wildland activities such as range, wildlife, or recreation management; or regularly engaged in those phases of utilization having a relation to the growing of forest crops.

This provision of Bylaw 5 stems back to the 1930's and the era of the Civilian Conservation Corps. It was originally adopted at a time when the Society had begun to strengthen its educational standards, and was intended to admit to membership graduates of ranger schools and subprofessional courses, and also persons who had no educational qualifications at all but who had certain qualifying experience which was accepted in lieu of education.

In recent years, with the strong emphasis being given by the Society to increasingly high educational standards, it has become evident that an inconsistency exists in membership policy. On the one hand, the higher accrediting criteria result in stricter requirements for Junior Membership, the entering professional grade.

On the other hand, the extremely liberal requirements of Class B make it unnecessary for an applicant to show any education whatever, either in forestry or anything else.

Many members and some Sections, notably the Allegheny Section, have urged that the Council review Bylaw 5 with a view toward requiring applicants for membership to have collegiate training in a school of forestry, as a basic requirement for admission. This was also a recommendation of the Council Committee on Membership.

Accordingly, on a motion by Dr. Goddard, seconded by Dr. Vaux, the Council unanimously voted to repeal Class B of Bylaw 5, effective April 1, 1960.

Repeal of Class B means that after April 1, 1960 applications for Affiliate Membership will not be accepted from persons seeking admission on the basis of experience alone or on a combination of experience and education.

This action does not affect the membership status of present Affiliate Members who entered through the provisions of Class B. All present Affiliate Members continue in their membership as long as they remain in good standing with respect to dues payment.

Advancement to Junior Member

Dr. Vaux, chairman of the Council Committee on Membership, introduced the following resolution, which was seconded by Mr. Hagenstein, and unanimously adopted.

In fulfilling its central purpose of advancing the profession of forestry, the Society recognizes the crtical importance of maintaining with rigor the professional qualifications of those admitted to Junior Membership. Particularly careful judgment is needed in evaluating qualifications of applicants for advancement from the grade Affiliate, Class B, to Junior Member. Advances in the technical complexity of the profession and increasing numbers of applications for this type of advancement have made this a problem of increasingly vital concern in the maintenance of professional standards. Administration of the provisions for such advancement therefore requires increasingly careful, critical, and well-informed consideration by all members and officers concerned with such advancement. Accordingly, the Council calls attention to the provisions of Bylaw 6 that, for advancement from Affiliate Class B to Junior Grade, the candidates must give satisfactory evidence that "during their total experience they have gained a knowledge of all the professional courses included as a minimum in an approved curriculum in an accredited forestry school." The Council further emphasizes that its Membership Committee is not authorized to approve applications for such advancement unless the applicant has provided unequivocal and objective evidence to this effect.

The attention of all Section and Chapter membership committees is invited to the foregoing resolution.

Fifth World Forestry Congress

A special fund is being set up to contribute toward helping defray the expenses of foreign foresters who are outstanding specialists in some phase of applied forestry or research, whose presence at the Fifth World Forestry Congress to be held in Seattle in 1960 would add to the technical sessions. Some of these persons, although key figures in their native countries, will need financial assistance in order to come to the United States to present invited papers.

On a motion by Mr. Allen, seconded by Mr. Malsberger, the Council unanimously voted to make a token contribution of $100 toward this fund.

Cubic Foot Tree Measurement

The following statement on standardization of cubic foot tree measurement was prepared by Kenneth P. Davis:

Widespread development of permanent sample plot systems in forest management, as increasingly applied by private, state, and federal agencies, brings an old problem to the fore; the need for more uniformity in making certain tree measurements.

A major need is consistent use of cubic measure and determination of tree height, total height wherever possible. Most people agree that cubic measure is the best primary base for volume measurement from which necessary conversions to cords, board feet or other units can be made. Also, total tree height, with most species at any rate, is a consistently measurable height value which can be converted to any desired merchantable top. At present, a miscellany of utilized top heights are measured that keep changing and upsetting volume and especially total growth comparisons over time. It is fully appreciated that tree height, either total or to some other specified point, is a difficult measurement and there are good reasons for employing fixed or variable top height measurements in current practice.

But millions of trees are being measured and many of them permaently. A large investment in permanent plot records is being built up. This is a good time to encourage use of an absolute volume measurement unit, cubic feet, as a consistent base for conversion to whatever other units may currently be desirable. A number of industrial people have told me that they recognize the desirability of cubic measure in setting up their inventory system but that they did not do so, partly because of general inertia, but mainly because clear and consistent procedures were not at hand. Several have urged that the matter be brought to the attention of he Council.

It is believed that the Society could make a substantial professional contribution by preparing recommendations for standard use of cubic foot measure with particular reference to inventory plot application. Such action, bearing Society endorsement, would do much to encourage use of cubic measure and of absolute tree measurements in general.

There is no illusion about supplanting cord, board foot, weight, and other units and it is fully recognized that there could be nothing mandatory about use of cubic foot measure. But there is increasing interest in its use in the United States and the need for consistency in permanent plot records offers a particularly logical entree to encourage its use.

Cubic measure has been urged by American foresters from time to time and has long been employed in research sample plots. The most specific plea for its general use was made by Rapraeger 20 years ago (Rapraeger E. F., 1950, "The Cubic Foot as a National Log Scaling Standard," U. S. Forest Ser., Nor. Rocky Mtn. Forest and Range Expt. Station Paper 24—a reprint of an unnumbered publication issued in 1939). The cubic foot has long been used as the basic unit of measure in presenting total forest volumes in Forest Survey and similar reports.

By the terms of its character, the Division of Forest Management is the proper group to consider this matter (JOURNAL OF FORESTRY, Vol. 49, p. 594). It is accordingly suggested that the Council, by motion, ask that this Division organize a committee to study use of the cubic

foot, and also use of other absolute tree measurements as they may desire, and prepare a procedural statement. It is hoped that this statement can be published by the Society.

On a motion by Dr. Davis, seconded by Mr. Hagenstein, the Council voted unanimously to request the Division of Forest Management to appoint a committee to study the use of the cubic foot, and also the use of other absolute tree measurements as the Division may desire, and to prepare a procedural statement.

Revised Bases for Accrediting Schools of Forestry

In behalf of the Committee for the Advancement of Education (F. H. Kaufert, chairman; G. B. Hartman, C. M. Kaufman, W. F. McCulloch, and Ernest Wohletz), Dr. Kaufert presented to the Council the Committee's unanimous recommendations for revisions in the bases for accrediting schools of forestry.

On a motion by Dr. Vaux, seconded by Mr. Clark, the Council voted ten to one (Mr. Briegleb dissenting) to adopt the recommendations.

The revised bases will be printed and distributed to all schools of forestry early in 1960.

One of the Committee's recommendations that is herewith made a matter of record, as approved by the Council, is to revoke the previous category of "Provisional Accreditation." Henceforth, institutions will be classed as accredited or not accredited.

University of New Hampshire Accredited for Forestry

Acting on the unanimous recommendation of the Committee for the Advancement of Forestry Education, and on a motion by Dr. Goddard, seconded by Mr. Hagenstein, the Council unanimously voted to accredit the University of New Hampshire Department of Forestry for professional instruction in forestry.

As of November 1959, 28 colleges and universities are accredited by the Council of the Society for professional instruction in forestry.

Editor of Forest Science

S. H. Spurr, who has been editor of *Forest Science* since its inception in 1955, has found it necessary to resign because of an assignment in New Zealand.

By unanimous vote of the Council his resignation was accepted with regret and gratitude. President Garratt was requested to write a letter to the president of the University of Michigan in appreciation and commendation of Dr. Spurr's services.

By consensus of the Council, Kenneth P. Davis was asked to serve as editor *pro tem* until a successor can be appointed.

Stephen F. Austin State College Not Accredited

Acting on the unanimous recommendation of the Committee for the Advancement of Forestry Education, the Council unanimously voted adversely on the application for accreditation by Stephen F. Austin State College of Nacogdoches, Texas.

At the same time the Council commended Dr. Arne K. Kemp, head of the Department of Forestry at the College, on the progress made in strengthening the faculty and curriculum.

Committee on Licensing

In view of the widespread interest among the Sections in state licensure of foresters, and as a result of the panel discussion on this subject held during the Society Affairs session on November 16, the Council was requested to authorize a standing Committee on Licensing.

On a motion by Mr. Hagenstein, seconded by Mr. Briegleb, the Council voted unanimously to authorize the committee.

Designated to serve on it were Archie E. Patterson, chairman, School of Forestry University of Georgia, Athens, Ga.; together with Terrill D. Stevens, Wilbur B. DeVall, Lloyd P. Blackwell, and Douglass C. Welch.

Among other duties, the Committee has been asked to serve as liaison between the Sections and the parent Society.

Meteorological Society

The American Meteorological Society has invited the Society of American Foresters to designate a representative to serve on AMS's Committee on Agricultural Meteorology.

On a motion by Mr. Clark, seconded by Mr. Allen, the Council unanimously authorized the President to designate a SAF representative to this Committee. William E. Reifsnyder, associate editor of the JOURNAL OF FORESTRY for forest fire, was appointed.

Program for National Forests

On a motion by Mr. Hagenstein, seconded by Dr. Davis, the Council unanimously commended the Secretary of Agriculture for his foresight in preparing the forward-looking "Program for the National Forests" which provides for an orderly long-time plan of development of these public lands to their highest use.

The President of the Society was authorized to send letters to the Secretary of Agriculture, and the chairmen of the Senate and House of Representatives Committees on Agriculture and Forestry.

Improving Communications

On a motion by Mr. Hagenstein, seconded by Mr. Clark, the President was unanimously authorized to appoint a committee to explore the possibility of improving communications between the executive office and the Sections, including the formation and expression of Society positions on broad policy questions.

Spring 1960 Council Meeting

In behalf of the Rocky Mountain Region of the U. S. Forest Service, Mr. Clark invited the Council to hold its spring 1960 meeting in Colorado.

On a motion by Mr. Hagenstein, seconded by Dr. Goddard, the Council acknowledged the invitation with thanks, and referred the place and dates of the meeting to the incoming Council.

Society Affairs and Division Reports

The annual Society Affairs session of the 59th annual meeting of the Society was held on the afternoon of November 16, 1959, in the Sheraton-Palace Hotel, San Francisco, Calif. President Garratt presided.

Division business sessions were held on varying dates in connection with Division technical sessions. Technical session papers will be published in the *Proceedings* of the meeting.

Report of the President

George A. Garratt

As my term of office draws to a close I want to take this opportunity to express my appreciation for the privilege of serving the Society of American Foresters during the 1958-1959 biennium. This has been one of the most rewarding periods in my professional career, with the frequent opportunities it has brought to see the national office and the Sections in action and to discuss Society affairs and other professional matters with many of our members. I have been particularly impressed with the devoted service given to the Society by the staff of the Washington office, the members of the Council, the officers of the Sections, and many individuals among the membership at large. The friendships and associations formed and the loyal support I have received will be cherished always in my memories of these two years.

The national and sectional meetings I have been privileged to attend in my official capacity have been both highly instructive and inspiring. I have been particularly impressed with the constructive discussion of matters pertaining to the development of our profession and with the fact that professional solidarity is becoming increasingly evident in dealing with the really important problems. The extent to which the younger members are participating in the programs and affairs of the Society bodes well for the continued advancement of forestry in the United States.

My one regret is that conflicting dates and the limitations of my schedule have prevented me from making the complete round of Section meetings. I offer my apologies to the three Sections I have been unable to visit during these two years, and hope that my successor will find it possible to make early amends for my unavoidable neglect. While on the subject of Sections, I want to highlight one of the outstanding events of the current year, the establishment last September of the Alaska Section as the twenty-second in the Society family. This change in status of the former Alaska Chapter of the Puget Sound Section represents the first addition to the rolls since 1942, when the Kentucky-Tennessee Section was formed. I want to extend a most hearty welcome to the representatives of the Alaska Section who are with us today, and ask that they convey to the members back home the very best wishes of the entire Society membership.

At the request of representatives of several of the Sections, a joint conference of the members of the Council and Section Delegates was revived in connection with this annual meeting, to provide a forum for discussion of matters of mutual interest. The agenda for the meeting held last evening included discussion of the topics of Section-Chapter relations, Section-national office relations, development of Section programs for the recruitment of qualified students for the forestry schools, and the operation of a Section policy and legislative committee.

The executive secretary will report in some detail on the matters of Society finance and membership, and it is not my intent to "steal his thunder." However, I do want to make a general comment on each of these items. Thanks to the outstanding ability of Miss Warren, our business manager, we still continue to operate in the black, with an anticipated net income for 1959 approximating that of the preceding year. Thanks also are due to Lloyd Thorpe, the Society's advertising representative, for the outstanding service he continues to render in his area of operation.

While our financial situation continues to be satisfactory, I want to re-emphasize a matter which I had pointed up in my 1958 report. This is the need for a substantial reserve to support important projects which the Society may wish to undertake from time to time. We are still almost entirely dependent upon grants from foundations for financing important studies deemed worthy of Society sponsorship, with the result that more than a few worthwhile projects have had to be deferred indefinitely or even abandoned for lack of funds. It is hoped that the coming year will see the start of a project for the establishment of an endowment for the indicated purpose.

With regard to membership, it is most satisfying to note the continued growth of the Society. It is anticipated that, by the end of the present calendar year, the Society rolls will list approximately 13,000 members in all grades, almost half of them in the Member grade and about 10 percent in the important Student grade. It should be noted that the executive secretary has set a goal of 14,000 members by the time of the 60th Anniversary meeting, a year from now, and I appeal to all of you for support in this endeavor, in seeking out eligible men who are not now members and interesting them in the Society and its program.

Reports on the JOURNAL OF FORESTRY and *Forest Science* will be made by the editors of these two periodicals, but I want to take this opportunity to compliment them and their associate editors for the outstanding work they have been doing. My associations with the JOURNAL during the past months have made me particularly aware that the criticisms which come his way can often make the editor's job a seemingly thankless one. However, I am sure that most members of the Society have real appreciation for the dedicated service which Arthur Meyer is giving in his efforts to make the JOURNAL OF FORESTRY an even more outstanding professional publication. While on the subject of the JOURNAL, I want to make a brief comment regarding the monthly Council's Column, which was initiated two years ago as a substitute for the earlier President's Column. From my point of view this has been a most satisfactory innovation, not only in relieving the President of the responsibility of meeting monthly deadlines, but what is far more important in giving the other elected officials of the Society an opportunity to express themselves to the membership on matters of professional and Society significance. The breadth and

interest of the subject coverage of these columns over the past two years has been a source of marked satisfaction to me.

At its meeting last April, the Council authorized the issuance in 1960 of the English edition of the *World Directory of Forestry Schools,* as compiled by the Food and Agriculture Organization of the United Nations. The timing of this publication is intended to coincide with the Fifth World Forestry Congress in Seattle, in which meetings forestry education will have an important place. This publication is intended to be a complete reference book on schools of forestry of college and university level throughout the world, and it will be much more comprehensive than the first edition of the Directory published by FAO in 1953.

Significant progress is being made in the Study of Education in Forestry and Related Fields of Natural Resource Management, begun in 1958 under the financial sponsorship of the Old Dominion Foundation, Inc. The resignation of Harold G. Wilm last December, following his appointment as Commissioner of Conservation for New York State, made it necessary to appoint a new director of the study. We have been most fortunate in securing the services of Samuel T. Dana for that post and the study is now proceeding apace, with the able full-time assistance of Evert W. Johnson, who has been associated with the project since its inception. Completion of the study is scheduled for 1961, with the publication of the findings in book form.

Under the financial sponsorship of Resources for the Future, Inc., which has made a one-year grant of $7,000 to the Society, the Natural Area Survey in the Southeast was begun early this fall, with the selection of Francis H. Eyre to head up the field investigation involved in the indicated project. This is an important aspect of the program of the Committee on Natural Areas of the Division of Silviculture, which, under the chairmanship of John F. Shanklin, has been searching out areas representative of forest types indigenous to the Southeast, that these may be permanently reserved for future observation and research. Up to the point of receiving the indicated grant, the Committee's pursuit of its objective of locating natural areas had been largely through correspondence.

Two new committees were established during the year now coming to a close. One of these is the Committee to Explore the Professional Income of Foresters, under the chairmanship of Paul M. Dunn. The Council has approved the recommendation of this committee that a survey be made through the medium of an anonymous individual questionnaire to SAF members to determine the 1959 professional income of members of our profession, with the results scheduled for publication in the JOURNAL OF FORESTRY during the fall of 1960. The Committee's report to the Council pointed up the utility of such a survey both to foresters, who should find the data useful in measuring their rate of progress in the profession, and to employers, who would be provided with information useful in recruitment and in establishing salary standards. It was also indicated that helpful information would be provided prospective foresters in comparing salary scales with those of other professions. This study is not to be confused with the spot salary survey recently undertaken in the course of the Study of Education in Forestry and Related Fields of Resource Management. The full report of this new committee to the Council will be contained in the minutes of yesterday's Council meeting. (Published in this issue of the JOURNAL.)

The second new committee is that on Forestry Research, under the chairmanship of George M. Jemison. This six-man committee, comprised of representatives of the U. S. Forest Service, forest industries, and forestry schools, is charged with the task of considering all aspects of research in forestry—appropriate to public and private agencies, as well as educational institutions—with the objective of promoting more effective and productive efforts by all organizations interested in such research. This group held its first meeting yesterday.

While on the subject of committees, I should also point up a change in the chairmanship of the Committee for the Advancement of Forestry Education. As a consequence of the aforementioned change in occupation, Harold G. Wilm also found it necessary to relinquish his post as head of this very important Society committee. We have been most fortunate in gaining the services of Frank H. Kaufert, a former member of the accrediting group, who has been appointed chairman of the indicated committee.

Planning is going forward for the celebration of the 60th Anniversary of the founding of the Society, as part of the 1960 annual meeting to be held in Washington, D. C. on November 13-16. An outstanding program is being arranged for this meeting. Because of the historical significance of this celebration, it was the Council's decision to limit special recognition at the 1959 meeting to a single award, that for achievement in Biological Research. Accordingly, both the Sir William Schlich Memorial Medal and the Gifford Pinchot Medal will be awarded at the 60th Anniversary Celebration. A commemorative book, *Sixty Years of Forestry in the USA,* is being prepared to mark the anniversary. This is being written by a selected group of members of the Society, each charged with the preparation of a chapter pertaining to his particular field of professional interest.

In this, my final accounting to the membership, I have already singled out several members of the Society for commendation. As I close this report, I want to pay special tribute to another member of the staff, whose loyalty and devotion to the Society, and untiring efforts in promoting its objectives and ideals, have been the driving force behind the notable progress our organization has made over the past two decades. That the Society of American Foresters has maintained its place in the sun, among the professional organizations in this country, is largely attributable to the vision, zeal, and adherence to high principles shown by our executive secretary during the 22 years he has spent in the Society's service. It is my great pleasure to call on Henry Clepper for his report to the Society.

Report of the Executive Secretary

Henry Clepper

Membership

As of October 31, 1959 the roster of members was as follows:

Student Members	1,025
Junior Members	4,415
Members	6,096
Fellows	88
Affiliate Members	895
Associate Members	233
Corresponding Members	144
Honorary Members	20
Total	12,916

In addition, applications for membership during November total 119, hence our membership as of the end of 1959 will exceed 13,000.

Finances

Total income for the fiscal year 1959 is estimated to be $183,150. The principal item of income continues to be dues payments of members; estimated for this year at $119,000. The next largest item is gross revenue from advertising; estimated to be $43,000.

Total expense for 1959 is estimated to be $172,383.

Your Society is operating in the black, and net profit for the year should be $11,767.

Sections and Chapters

During 1959 a group of members of the Alaska Chapter, Puget Sound Section, petitioned the Council for authorization to form the Alaska Section. Approval of the Section was given last May. Carlos T. Brown of Juneau was designated chairman *pro tem.*

At the Section's organization meeting, held in Juneau on September 23, new officers were installed, with Von Johnson of Anchorage as the first elected chairman.

The Society now has 22 Sections and 75 Chapters, and all are active.

Plans for 1960

As you know, during the year 1960 the Society will celebrate its 60th anniversary. Among our activities during this historic year:

We hope to conduct a study of the professional income of foresters.

Publish a world directory of forestry schools, cooperatively with the Food and Agriculture Organization of the United Nations.

Publish our own book *Sixty Years of Forestry in the U.S.A.*

Participate in the Fifth World Forestry Congress to be held in Seattle, August 29-September 10.

Hold our own Diamond Jubilee anniversary meeting in Washington, D. C., November 13-16.

TABLE 1.—CATEGORY OF ANSWERS BY PRINCIPAL MEANING TO 1958 JOURNAL OF FORESTRY READERSHIP QUESTIONNAIRE (AS OF MAY 1, 1959)

A. No change
- 515—Satisfied; no change needed; complimentary
- 101—Satisfied, with minor suggestions or reservations

B. Changes suggested with a positive approach
- 382—Want more applied, practical, general interest material; material by or for field foresters
- 257—Want more on a specific subject matter field in forestry
- 130—Want more on policy, controversial issues, discussion of legislation (including editorials on such)
- 93—Want more on a specific geographical region, including several listing world forestry
- 86—Want research writers to: demonstrate application of results to practice; write more simply and understandably; use a lead summary
- 40—Want more articles with less emphasis on other departments than articles and notes; more and shorter articles; do not popularize
- 26—Want more illustrations; suggest improvement in format, make-up, type
- 13—Want letters to the editor, or questions and answers, or "how to do it" column

C. Changes suggested with a negative approach
- 167—Want less research; too academic; too technical; articles of restricted interest or local, or are too detailed
- 28—Want less statistical analysis, formulae, graphs, undefined, little used terms

D. Miscellaneous comments
- 44—On promotion of profession; SAF matters; better salaries
- 31—Special issues (one unfavorable)
- 15—On the relationship of the *Journal* and *Forest Science*: combine; further differentiate; offer optional subscriptions
- 14—Relative to advertising: remove reduce; should interfere less with text; approve

E. Unclassified
- 196—Meaning not apparent; too diversified to classify; suggestions not elsewhere listed; suggestions that are presently in effect

F. Other
- 37—Nothing to do with question or otherwise contributing
- 13—Derogatory or facetious

Total 2,188

3,406—Returned questionnaire with statistical information checked but without making any comments, or specifically stating "no suggestions" or "no comments"

Report of the Editor

During the past year the SAF editor has spent a larger proportion of his total time on the JOURNAL, in contrast to other editorial work, than in previous years.

The year included two special issues, one on tree improvement, one on forest insects.

We secured an evaluation of the magazine's format, or physical make-up, from a professional in this field. A few minor changes were made on his recommendation, but in general he considered make-up satisfactory to the JOURNAL's several purposes.

The editor participated in a panel discussion of the Central States Section on the subject of how the JOURNAL can better serve the profession.

He had an opportunity to make a field trip for the purpose of preparing a full length article for the JOURNAL. The subject was fire control in the Northern Rocky Mountain area.

During the year, five separate items were published dealing with functions of the JOURNAL and views on how well it serves the Society membership.[1] Included was a formal resolution by the Columbia River Section on suggested improvements.

In addition to the foregoing, a readership survey was conducted by mailed questionnaire. Four parts of the questionnaire sought information on the individual reader's interests and background. A fifth question is quoted as follows: "The primary objectives of the JOURNAL are to advance knowledge of the sciences and practice of forestry and to serve as a forum for discussion of matters of major importance to the profession as a whole.

"What changes, in your opinion, might enable the JOURNAL better to attain these objectives?"

It is impossible to give more than a rather sketchy summary of the replies to this question. When you solicit opinions from 12,000 people you are bound to get a wide diversity of answers. (See Table 1.)

As of May 1, when the majority of Society members had paid their dues and those who wished had returned the questionnaire, a compilation was made. On that date 5,234 individuals had returned the questionnaire. Of this number 2,188 replied to the question as to what in their opinion would improve the JOURNAL. The remainder

[1] Minckler, Leon S. Some comments regarding the Journal. Jour. Forestry 56: 769-770. 1958; Frantz, Harvey R. On Journal articles. Jour. Forestry 57:46. 1959; Williams, Robert D., and F. Bryan Clark. We need a standard subject matter classification system for the Journal of Forestry. Jour. Forestry 57:444. 1959; Johnston, James. A resolution for the improvement of the Journal of Forestry. Jour. Forestry 57:465-466. 1959.

filled out the several statistical questions but expressed no opinions.

Words mean different things to different people but the following is the editor's evaluation of the answers given to the question:

606 individuals out of the 2,100 thought the JOURNAL needed no changes, was properly fulfilling its functions.

1,027 had suggestions to make of a *positive* nature. That is, these persons said in effect "I am not criticizing the JOURNAL as is but would consider it of more value to me if such and such were done." Topping the list under this category were those who wished to see more articles and notes of general interest, more practical, applied material for the practicing forester. Next were those who wanted more on a specific subject matter field in forestry. Third were those who wanted more discussion of controversial issues, including opinions on legislative matters affecting forestry.

195 persons took a *negative* view. They said the JOURNAL was too academic, too technical, carried too much material they considered of only local interest or restricted to specialized fields.

104 made miscellaneous comments, of which the greatest number thought the JOURNAL should do more to promote the profession, including efforts to increase foresters' salaries.

196 made comments or suggestions that either had no apparent meaning or led one to assume the commentator had not been reading the JOURNAL.

Out of the total, there were only 13 questionnaires that bore comments that were derogatory or facetious, mostly the latter. Of this group one unidentified individual because of his ability to be brief and expressive is invited to become a JOURNAL writer. He said "Leave it alone, it's bad enough as is."

A report of this readership survey could be made in much greater detail but the detail in turn might obscure its usefulness. We are concerned with general categories of opinion, not shades of meaning. It seems reasonable to conclude that there is encouraging interest on the part of the membership in the JOURNAL. The major suggestion for change is that it carry more material of general interest to a wider proportion of the profession. There is certainly no quarrel with this viewpoint. The question is how to secure material that is of general interest and yet falls within the realm of pertinence in a publication devoted to the aims of the profession. We could employ writers and assign subjects. This would not only be expensive but could readily change the entire complexion of the JOURNAL and in so doing its assigned role as a mirror of professional knowledge and opinion. At this stage of our growth it seems more reasonable to suggest that the membership of the Society can do much to make the reflection in the mirror clearer in its outlines, sharper in its details. The membership can do so by taking an active interest in the JOURNAL, by themselves contributing or by encouraging others to do so. Such contributions can be actual submissions for publication, suggestions for possible subjects and authors, or constructive comments.

The editor proposes to solicit, and himself contribute to, a series of brief articles on:

(1) The function of a publication in serving a technical profession;

(2) The part necessarily played by members of the profession in contributing to such a publication; and

(3) Some of the things that have to be considered or done if the JOURNAL is to assume a larger role in American forestry.

During the past year the backlog of unpublished material has built up, partly through increased unsolicited submissions, partly because of special issues with solicited material.

Plans for the coming year include a special issue on watershed management, another on forestry in the new state of Alaska.

In connection with the 5th World Forestry Congress, the Society will publish a world directory of forestry schools. This project, being handled by Mr. Eyre, is in cooperation with the FAO.

A 4th cumulative index of the JOURNAL OF FORESTRY is in progress of completion by our good friend Martha Meelig of the New York College of Forestry.

As a part of our observance of our 60th anniversary next year the Society is to publish, with the help of numerous members, a book recording 60 years of progress in American forestry.

The editorial staff wishes in conclusion to note the Society's continuing indebtedness to the many members whose contributions make Society publications possible. We wish also to pay special tribute to the board of associate editors, without whose freely given aid a technically sound JOURNAL OF FORESTRY would be most difficult of attainment.

ARTHUR B. MEYER

Report of the Editor of Forest Science

With the publication of the current issue, *Forest Science* has completed its fifth year of publication as a quarterly journal of research and technical progress. Also, during 1959, the first number of *Forest Science Monographs* has appeared. This associated series is designed to publish longer articles than can be handled in the parent journal.

Staff.—The advisory board, consisting of twelve specialists appointed for 3-year staggered terms, has borne the brunt of reviewing articles submitted for publication, although the specialized nature of many papers makes submission to other scientists necessary in many instances. The onerous task of preparing articles for the printer and of putting out each issue has been in the competent hands of F. H. Eyre. With such assistance, the task of the editor has become much easier.

Number of articles handled.—During 1959, 67 articles have been submitted to date. Forty-five were published in volume 5 which consisted of 416 pages plus one monograph of 49 pages. The number of articles handled has remained remarkably constant over the 5-year history of the journal. An average of 70 have been submitted each year and an average of 54 published. Counting the several articles turned over each year to the JOURNAL OF FORESTRY, approximately 70 percent of the total number of articles submitted have eventually been published. The remaining 30 percent have either been rejected in a continuing effort to maintain the high quality of the journal, or have been withdrawn by the authors and published elsewhere. The present size of the quarterly seems well fitted to the flow of manuscripts over the past five years.

Subject matter content.—The pages of *Forest Science* are not restricted to any particular fields of forestry. Rather, the journal is especially suitable for articles of interest primarily to scientists and educators. These typically include articles:

a. Dealing with basic research or reporting original research.

b. Emphasizing research techniques and procedures.

c. Concentrating on the explantion of research results and what led to them, rather than on the possible ways of applying them.

d. Treating fundamental subjects such as forest soils, forest tree physiology, forest genetics, bio-

metrics, theoretical forest economics, and detailed studies in forest pathology and forest entomology.

e. Which would otherwise be acceptable to the JOURNAL OF FORESTRY, but which are not suitable for that journal because of length or other publication problems.

f. Book reviews emphasizing: (1) short notices of foreign-language books, (2) longer essay-type treatments of selected important works, and (3) evaluation of English-language studies in forestry from the particular viewpoint of the scientist.

It may be of interest to analyze the subject matter content of the 204 articles published in the past five years. Of the total number, 179 or 88 percent have been in the general field of forest biology, with 16 or 8 percent in statistics or mensuration, 5 in forest economics, and 4 in wood technology. *Forest Science* has become, therefore, primarily a journal in forest biology. Papers in other fields relating to *Forest Science* have been solicited but have come in relatively few numbers. The largest number of papers in forest biology has been in the general area of forest tree physiology, including related aspects of morphology, anatomy, and biochemistry, totaling 50 or 25 percent of the total number of articles published. Forest pathology comes next with 31 articles, followed by forest ecology with approximately 24. About equal numbers of articles have been submitted in forest entomology, forest tree genetics, forest soils, and silviculture. The relatively small number of papers in forest genetics reflects the fact that few so-called forest geneticists are actually carrying on fundamental work in genetics, but rather tend to work in various aspects of physiology and other related fields. It also reflects the existence of *Silva Genetica*, an international journal published in Germany which publishes forest genetics articles in the English language. In addition to the published articles, some 60 book reviews and 7 notes have been included in the pages of *Forest Science* over the past 5 years. It is hoped that in the future, the notes section will be expanded to include discussions of controversial articles previously published.

Time required to process articles.—The members of the Society may be interested in an analysis of the time required to accept an article and to publish it once it has been accepted. The procedure differs according to whether the manuscript has been submitted directly by the author or through the Washington Office of the U. S. Forest Service as having originated from Forest Service research personnel.

In the former case, the article is sent out to at least two reviewers, who may or may not be members of the Advisory Board. While the Board members do a great deal of the reviewing, the specialized nature of many of the articles submitted makes it desirable to distribute the reviewing load and to call upon outside specialists, who in almost every case have been more than willing to help. Most of the articles that have been submitted directly by the authors attract comments from the reviewers of such a nature that the manuscript is returned to the author for consideration of these comments. Of the 32 articles published in 1959 from manuscripts submitted directly by the authors, more than half of them were returned to the authors for revision. Excluding the number of days that the manuscript was in the author's hands for revision, an average of 68 days was required to process these articles prior to acceptance by the editor and transmission of the manuscript to Washington. This period represents the average length of time required to review the manuscript by two and possibly three reviewers, by the editor, and for transit between these individuals.

In contrast, articles that have been submitted through the Washington Office of the U. S. Forest Service have been through a board of review and the recommendations of this board are transmitted to the editor together with the manuscript. Because of this information, much less time is required to process these manuscripts once they have been received by the editor. Leaving out one controversial article which received considerable subsequent review, the average time necessary to process U. S. Forest Service contributions in 1959 was 15 days, a saving of 53 days over articles submitted directly by the author. During this 15-day span, at least one additional reading was given the manuscript.

Once the article has been accepted, it is hoped to publish it within the next one or two issues of *Forest Science*. Some delays are, however, necessitated by requirements of filling the pages of *Forest Science* to a multiple of 16 for each issue, and by an excess number of manuscripts that may be on hand at any given time. During 1959, out of the 45 articles published, 10 were published in the next issue following the date of acceptance, 25 were published in the second issue appearing after the date of acceptance, while 10 were published in the third following issue. An average of 6 months was required from acceptance to actual appearance of the publication.

Publishing the date of receipt of the manuscript.—It is common practice in many scientific journals to publish the date on which the manuscript had been received by the editor. A number of authors have suggested that *Forest Science* adopt this practice and it is a consensus of opinion of the Board of Editors and the Advisory Board that this be done. A problem is occasioned, however, by the fact that U. S. Forest Service articles receive their major review before they are submitted to the editor, while manuscripts mailed directly by the authors receive most of this review subsequent to their receipt. To compensate at least partially for this difference in procedure, it is the intention of the Board of Editors to publish dates of submission in essentially final form as follows: (1) Articles mailed by the authors directly to the editor as of date received at his office. (2) Manuscripts submitted through the Washington office of the Forest Service as of the date they are first received by Dr. Harper in his capacity as a member of the Board of Editors. This will permit listing a date after the manuscript has cleared the individual experiment station, but before it has been sent out by the Washington Office to the Board of Review. (3) Manuscripts transferred from the JOURNAL OF FORESTRY to *Forest Science* will be listed as of the date they are submitted to the JOURNAL OF FORESTRY.

Editorship.—Your present editor has been active since the idea of a scientific journal in forestry was first discussed at our national meetings. During his five years of editorship, he has participated in all aspects of publication, business management, layout and design, and public relations. Over this period, however, much of the actual burden of putting out the journal has been gradually transferred to the Washington Office of the Society. The warm and continuing support of Henry Clepper and Audrey Warren, together with the hard work and never ending patience of F. H. Eyre, have made the task of editing *Forest Science* enjoyable and profitable. The considerable help of Kenneth P. Davis, who served as acting editor in 1957-1958, has also been instrumental in getting

the journal on its feet. In January of 1960, however, your editor is leaving the country on a sabbatical assignment from The University of Michigan. The time seems propitious, therefore, for him to turn over the reins of editorial management to another. He has enjoyed his task and thanks the Society for their warm support during this inaugural period.

STEPHEN H. SPURR

Report of the Committee on International Relations

Last year I outlined the preliminary plans for the Fifth World Forestry Congress. This year the preliminary plans are rapidly being refined and translated into firm preparations in which many members of this Society, and others, are participating. I think it is fair to say that this forthcoming Forestry Congress is being planned on a broader basis than any previous world forestry gathering—broader in terms of emphasis on the manifold uses of forest land and broader in terms of number of persons, both here and abroad, who are participating in the preparations.

The Fifth World Forestry Congress, in 1960, is now definitely scheduled to open on August 29 and to run to September 10. The place, of course, is Seattle, Washington, and the site, the Campus of the University of Washington.

Over-all planning for the Congress is in the hands of a 45-man United States Organizing Committee appointed by the Secretary of State. Chairman of this Organizing Committee is R. E. McArdle and its Executive Secretary, I. T. Haig. Dr. Haig is on loan from the Forest Service to devote his full time and talents to the task of helping to prepare and carry out the plans of the Organizing Committee's 9 major subcommittees. These subcommittees are (1) Executive, (2) Program, (3) Finance, (4) Tours, (5) Equipment exhibits, (6) Educational exhibits, (7) Information and Publicity, (8) Local Arrangements, and (9) Hospitality. Membership of these subcommittees totals about 300 persons, carefully chosen to represent the many interests in forestry and the forest-based industries, including timber products, recreational, water, wildlife, and all the other activities dependent upon the multiple uses of forest land.

The U. S. Organizing Committee has the full cooperation of the United Nations Food and Agriculture Organization in preparing for the Congress. This is an essential and gratifying aid to the United States in its role as host nation.

Over 50 national committees have already been set up in other countries to facilitate communication with the U. S. Organizing Committee on program topics, speaker assignments, and the other details of preparing for the Congress.

In broad outline, the program of the Congress will provide for three general sessions and some 40 specialized sessions. The program will start with two half-day general sessions on multiple use of forest lands. These sessions will keynote the Congress.

The third general session will be on progress in world forestry. This session will be presented largely by FAO and its sponsored regional forestry commissions. The Organizing Committee is hopeful that this particular feature of the program may be included in each succeeding World Forestry Congress. World forestry progress needs to be evaluated about every five years and the periodic World Forestry Congresses offer unique opportunities to achieve this objective.

The 40 specialized sessions—a session is one-half day—will be held two or three at a time over a period of several days. The sessions will be on topics dealing with 10 subject-matter fields: (1) silviculture and management, (2) genetics and tree improvement, (3) forest protection, (4) forest economics and policy, (5) education, (6) forest products, (7) forest and range watersheds, (8) forest recreation and wildlife, (9) logging and forest operations, (10) tropical forestry.

Simultaneous interpretation into the three official languages of the Congress—English, Spanish, French—is being planned for all sessions. The published proceedings of the Congress probably will include key papers in the three official languages. The other papers may be reproduced in full only in the official language in which they are presented, but with abstracts in the remaining two official languages.

The Tours Subcommittee is planning field trips to supplement the in-Congress program. Seven tours from which to choose will be offered our foreign guests—two pre-Congress excursions and five post-Congress tours to the major forest regions of the United States.

The Machinery and Educational Exhibits Subcommittees will further augment the program of the Congress by in-Congress displays to give the participants a well rounded picture of 1960 forestry.

The Hospitality Subcommittee, whose membership is made up of high-ranking leaders in the Pacific Northwest, will plan the extra-curricular activities that befit an affair such as a World Forestry Congress, and the fact that whereas the United States is the general host, the University of Washington, Seattle, and the State of Washington are the local hosts during the two-week sessions of the meeting.

The Subcommittees on Finance, Information and Publicity, and Local Arrangements have all been busy making sure that the Congress will operate effectively and smoothly. The Executive Subcommittee, under chairmanship of V. L. Harper, is the interim organ of the over-all Organizing Committee established to act for it in between its sessions. The Organizing Committee has met twice so far and may not meet again prior to the Congress. The Executive Subcommittee, on the other hand, has met more frequently, both formally and informally. It is a committee composed of members drawn from the over-all Organizing Committee and includes in its membership all the chairmen of the other subcommittees.

I should especially note the contributions of the Office of International Conferences of the State Department. The State Department's OIC has undertaken the big job of translating technical papers, of providing interpreters and equipment, and of doing all the other important tasks that go with an officially-sponsored meeting of the United States Government. The interest, support, and active participation of the State Department is deeply appreciated by the Organizing Committee.

And finally, I should make it clear that although the Congress is an official one with the United States Government as host, and although official delegates will come from many countries, invitations are not needed, nor will they be issued, insofar as individuals are concerned. The Congress will be open to any qualified person on application to the Organizing Committee and upon payment of the appropriate registration fee. Application forms will be widely circulated before long. Meanwhile, anyone in-

terested may obtain information on the Congress from the Executive Secretary, Fifth World Forestry Congress, Department of State, Washington 25, D. C.

The above represents the most important activity in international forestry of direct interest to the Society during the last year. Your SAF Committee on International Relations has participated in various ways in advancing preparations for the World Forestry Congress, not as a Committee function itself, but individually as members of other committees. It is a gratifying experience to us to see the wholehearted support of the Society in this major enterprise. The outcome is surely to be one in which the Society will have made a fine contribution to world forestry.

Turning to another international forestry matter—I am glad to announce that within the last few days the United Nations Food and Agricultural Organization has authorized the establishment, under its sponsorship, of a North American Forestry Commission. This new commission, which will be a continuing body, will include Mexico, Canada, and the United States. The first regional meeting probably will be held in 1961 in one of the three countries, yet to be decided upon. Subsequent meetings probably will occur at two-year intervals, with host responsibilities to be rotated. Establishment of this commission was jointly recommended by the three countries after intensive discussions among their forestry representatives.

This is the fifth regional forestry commission so far sponsored by FAO. The others are the Latin American, established in 1948; the European in 1949; the Asia-Pacific in 1950; and the Near East in 1955. The commissions are composed of government representatives functioning at the policy level, while their constituent committees and working parties, made up of public and private agency representatives, operate on the technical level. The commissions are concerned with exchange of views on forest policy and with improvement of silvicultural, protection, and other activities dealing with forest resources. They provide a forum where the interested countries may consider problems of mutual concern and arrange for desirable cooperation in forestry research and other programs.

PAUL BEDARD J. H. HARDEE
COL. H. B. DONALDSON H. L. SHIRLEY
GEORGE L. DRAKE S. H. SPURR
PAUL M. DUNN RUSSELL STADELMAN
I. T. HAIG V. L. HARPER, *Chairman*

Report of the Study of Education in Forestry and Related Fields of Natural Resources Management

This study got under way in the spring of 1958 with Dr. Harold G. Wilm as director and Dr. Evert W. Johnson as assistant director. Shortly after Dr. Wilm's resignation in January, 1959, to become Commissioner of Conservation of the State of New York, I was asked to take his place as director of the study, to which I have so far been able to devote little time because of prior commitments. During the past year, therefore, the study has been carried on almost singlehandedly by Dr. Johnson, whose energy, enthusiasm, and ability are responsible for the marked progress which has been made. From now on, I hope to be able to devote practically full time to the study.

The purpose of the study, which is financed by the Old Dominion Foundation, is to trace the evolution of education in forestry and related fields in the United States, to analyze present strengths and weaknesses, and to suggest improvements in the light of prospective needs for men with education at the professional, subprofessional, and graduate levels. In a word, the basic objective is to set goals for education in forestry and related fields, and to propose ways and means of attaining them.

The study has two major approaches —factual or objective, and philosophical or subjective—but it is often hard to draw a sharp line between them. The factual approach is largely historical, statistical, and analytical in character. Information has been obtained from the literature, from school announcements, from questionnaires and other correspondence, and from interviews. The process has not only thrown much light on what has happened in the evolution of education in forestry and related fields but on why it has happened. It has also yielded many views as to where we should go from here. Facts and opinions have been well interwoven.

This mass of material, when supplemented by additional data and by further interviews with educators, employers, and others will provide in part the basis for the philosophical, or subjective, part of the study. Opinions as to the future course which should be followed by education in forestry and related fields, although inevitably somewhat personal and speculative in character, must still be based on the best evidence available as to the most effective means of preparing prospective workers in these fields for the responsibilities which they will have to meet. The following questions are illustrative of some of the problems on which the study is attempting to throw light, with frank recognition of the fact that they are not subject to categorical answers which will be unanimously accepted as valid:

To start with the title of the study, what are "related fields"? Are not range management, wildlife management, watershed management, and recreation management as much a part of forest-land management as are timber production and wood utilization? Do they become related fields, and are they professions, when they deal with non-forest lands and when they become so specialized that curricula for the education of prospective practitioners no longer include all of the subjects regarded as essential for the education of a forester?

What *are* the essential subjects (professional, preprofessional, and nonprofessional) with which *every* forester should be familiar in view of the tasks which he will be called upon to perform in the next 10, 20, or 30 years? In addition to this "core" of forestry education, what further education does he need to make him not only a competent professional man but also a well-rounded individual and a useful citizen? Are present accreditation standards adequate in these respects?

Can the education needed by a forester today, and still more in the future, be provided in less than five years of academic work? If not, should a five-year program lead to a bachelor's degree or to a master's degree, or perhaps to both, depending on the character of the program and the quality of the student's performance? Should accreditation hereafter be limited to schools which offer five-year programs leading to a degree in forestry and which are qualified to handle such programs effectively? Or, if a five-year program is regarded as desirable but not essential, should there be different levels of accreditation, with different standards, and with the graduates of five-year and four-year programs eligible for different grades of membership in the Society?

Should more emphasis be placed on courses dealing with principles rather than with their application? Has the proliferation of courses that are primarily local, practical, or fragmentary in character reached the point where some intelligent birth control is in

order? What is the proper balance between instruction in theory and in practice at a school of forestry? Just where does the line come between "education" and "training"? Can, and will, the latter task be handled effectively by employers, thus leaving the schools free to devote themselves to "education"?

Should there be a more clear-cut distinction than now exists between professional and subprofessional work in forestry? Are many foresters now overtrained for the work which they are actually doing and undertrained for the work which they ought to be doing? What are present and prospective needs for subprofessional men in forestry? Do we need to make more adequate provision for their education, particularly if the standards of professional education are raised, and who should assume the task?

What is likely to be the future demand for general practitioners and for specialists? Is it feasible to include any truly graduate work *in forestry* in a five-year program? If not, should it not be frankly recognized that specialization does not start until a man enters on post-professional training leading to the degree of Doctor of Philosophy or Doctor of Forestry? Can, and should, the latter degree be given a scope and a content that will make it more distinctive than being the equivalent of a Ph. D. in a field which some graduate schools do not recognize as suitable for that degree?

These are merely samples of the many questions with which the staff and the supervisory committee headed by Dean Vaux are struggling. We do not expect to find the right answers to them all, if indeed there are any universally "right" answers. We do, however, hope that we can make some progress in that direction and that we can stimulate thinking on the part not only of educators and employers, but of the entire profession, which will result in strengthening educational processes in forestry and related fields of natural resources management. We shall be most grateful for any help which members of the Society or others may be disposed to render by expressing their views on the subject —either by correspondence or in print.

SAMUEL T. DANA
Director

Report of the Committee for the Advancement of Forestry Education

All Society members should be deeply interested in and concerned with professional forestry training, as well as with graduate training and research in the schools, colleges, and departments of forestry. The further development of forestry on all fronts and the growth and strengthening of our profession probably depend to a greater extent on the quality of professional forestry training than on any other single factor or combination of factors. Professional forestry training will be no stronger than you, the members of the Society, make it.

If you stand by while ambitious educators attempt to develop schools that are not a credit to professional forestry training, you are remiss in your duties as professional foresters. If you fail to take the actions necessary to further build and strengthen forestry training in institutions offering professional training in many fields, you are failing the profession. All areas of professional training are competing for the limited funds needed for strengthening. Those areas with the strongest support from the professions they serve will advance most rapidly.

The Society of American Foresters is to be congratulated on the fact that it is the only professional group concerned with the management of renewable natural resources recognized by the National Commission on Accrediting. H. H. Chapman, Myron Krueger, Harold Wilm, former chairmen of the Committee for the Advancement of Forestry Education and its predecessors, all past and present members of these committees, and especially your executive secretary, Henry Clepper, deserve credit for the stature they have given the Society through their contributions to the difficult problem of professional forestry training accreditation. However, among the 40 professional groups recognized by the National Commission on Accrediting, there are many, most of which have no more important responsibility for insuring strong training than foresters, that have advanced more rapidly. Their minimum standards are more adequate. They have been far more active in assuring that those entering their professions have received the best possible training. It would appear that they are more aware than foresters that the future of their professions rests to a major extent on the quality of young men attracted and the quality of training they receive.

The Committee for the Advancement of Forestry Education would also like to take this opportunity to clarify a point on which there appears to be considerable confusion. Individuals and institutions with ambitions to develop forestry training programs but unable to meet the Society's minimum standards consider the primary function of the Committee to be that of limiting the number of professional forestry training centers. While such limitation may well be a by-product of its activities, the Committee's primary concern is with quality and adequacy. The Committee's responsibility is to encourage and assist in the development and strengthening of professional forestry training and to insure that quality standards are met before SAF accreditation is given. The question of "how many forestry schools" is important to the profession as a whole, but it will be determined by job opportunities and competition and not by accrediting considerations. Our concern is with quality, not numbers.

Present Committee members and their predecessors have provided the Society with a set of minimum standards or "Bases for Accreditation." These bases have been published from time to time in the JOURNAL. They are the product of efforts by educators and practicing foresters. In common with all such bases, which involve quantitative as well as qualitative evaluation, they have their weaknesses and areas where personal judgment becomes a factor. These bases differ today from those initially developed by H. H. Chapman and his associates. By some they are considered too weak, by some too strong and excessive. They are admittedly a compromise and probably the very minimum that a large and strong professional group, such as the Society of American Foresters, can accept and still maintain its position among the professional societies of the nation. As our profession grows, as new areas of forestry knowledge develop, and as we add to the accumulation of knowledge in existing fields, so professional forestry training must change and grow, and with this will come added changes in the "Bases for Accreditation." This recognition has resulted in the Committee recommending to the Council desirable

changes that will improve the minimum standards.

The Committee for the Advancement of Forestry Education on November 15 reviewed and made recommendations to the Council on the following items:

(1) Strengthening and improving our present minimum accreditation standards. The importance of institutional status has been additionally emphasized, some increase in minimum staff requirements is recommended, the salary scale has been up-dated, and other changes made.

(2) During the past years two schools applied to the Council for official examination. These examinations have been made and the Committee for the Advancement of Forestry Education has reported to the Council.

(3) Preliminary examination was made of material on three additional four-year training programs not now accredited.

(4) Proposals for the establishment of two added four-year professional forestry training programs were reviewed. You have at this time 27 accredited and 18 non-accredited four-year professional forestry training programs, plus an abundance of ambition, on the part of many institutions now having pre-forestry programs, to expand these to four-year programs.

The Committee on Accreditation and the Council of your Society, which makes the final decisions and has final responsibility on all accreditation matters, need your full support in this important assignment of improving professional forestry education. Pressures and actions to improve the staff and facilities of institutions can bear more important fruit in the betterment of our profession than pressures to obtain accreditation of borderline programs. It should be remembered that our accreditation standards are minimum. They do not define the desirable or completely acceptable standards that alone can insure quality training for future foresters.

The Committee would like to emphasize to educators and professional foresters alike the statements in the September JOURNAL OF FORESTRY by Dr. Henry Schmitz, former SAF president, forestry school head, and university president. Forestry education, he points out, is not to be entered into lightly. To operate a first class school today requires a minimum annual operating budget of $100,000 and at least $1,500,000 for minimum facilities and equipment. In the solution to the problem of too many forestry schools and to that of insuring quality in professional forestry education, the Society has an inescapable responsibility.

G B. HARTMAN
C. M. KAUFMAN
W. F. MCCULLOCH
E. W. WOHLETZ
F. H. KAUFERT, *Chairman*

Report of Council Membership Committee

At each of the last three annual meetings I have had the privilege of reporting on behalf of the Council Membership Committee. Those previous reports have usually required fairly involved discourse on technical problems of our membership activities. Today I am glad to say that membership matters are in such good shape that no such lengthy report is necessary. But I want to take the opportunity to draw attention to two items.

First, in anticipation of the 60th Anniversary next year, the Council Membership Committee is recommending to the Council that the Society set a target of 14,000 members as our goal for 1960. This is a reasonable goal in the light of the numbers of eligible non-members. It is a highly important goal because the strength and effectiveness of a professional body like ours depends on the breadth of its membership base. To move forward in step with demands on the profession it is vital to enlist in the Society every eligible professional forester. Some may not be able to participate in Society activities due to personal circumstances. But every professional forester can support the Society which does much for him in terms of the fundamentals for professional growth.

To meet the 14,000 member goal is entirely feasible, but it will take time and effort. Much of the burden will fall on the Section membership chairmen and their committees. But they alone cannot do the job and should not be expected to do it. Every member can help. Individual members can render direct assistance to this membership campaign. When you are asked to furnish an endorsement statement, return it promptly; but take time to find out what the appropriate qualifications for membership are; make your evaluations objectively and carefully with as much supporting evidence as you can find. If you know of qualified non-members, pass their names along to your Section or Chapter membership chairman, and work with him to enlist the interest of the prospect. In these and other ways each member of the Society can help substantially in reaching the 14,000 goal. I solicit the help of everyone here to that end.

Secondly, for the last four years in the Membership Committee I have had first hand opportunity to see the tremendous volume of work done by our Section Membership Chairmen. Their chores are both difficult and time-consuming, and their devotion to their duties is one of the foundations of the Society's success. I want to take this opportunity to speak on behalf of the Membership Committee and the Council in calling public attention to the fine work our Section Membership Chairmen are doing and to express to those chairmen the heartiest appreciation for their efforts. They are too seldom recognized and their service should be emphasized here.

HENRY J. VAUX
Chairman

PART of the 200 SAF Members who had lunch at Henry Colwell State Park in the Santa Cruz mountains of California during 1959 annual meeting.

Panel Discussion
State Registration and Licensure of Foresters

Henry J. Malsberger, Moderator

Basic Principles Involved in Registration and Licensing of Foresters

Origin and History

Licensing originated in medieval times with the rise of the craft guilds. The guilds supplied the master craftsmen and limited the members permitted to ply their craft in a given locality. The practices of the guilds, although monopolistic, protected the public against incompetency and the craftsmen against injurious competition. Modern licensing laws in the learned and non-learned professions are a direct outgrowth of the monopolistic practices of the medieval guilds.

Registration, in the sense used in this discussion, refers to the act of registering qualified individuals by a government officer or board to officially or legally certify competence. Thus a "registered forester" is one certified by a state as being competent through education and/or experience to practice professional forestry. Licensing, on the other hand, refers to the granting of formal permission by a constituted authority to do something as, for example, to practice medicine or use the title "registered forester." The privilege granted is obviously denied those not similarly favored. Although it is possible to have registration without licensing or, conversely, licensing without registration, one complements the other, and with respect to the professions, are almost always enacted conjointly.

Before considering registration and licensing further let me digress for a moment to consider the meaning of the term "learned profession" and its relation to forestry. A profession is a vocation requiring knowledge of some department of learning or science. Originally there were only three recognized professions, theology, law, and medicine. These were known as "the professions" or the "learned professions." Today others are recognized as well and include such prominent ones as teaching, dentistry, and engineering.

When an erudite person discovers that his education makes him more efficient and skilled than the general run of practitioners in his field he is approaching professional status. But a single individual, or a group of individuals similarly educated, do not constitute a profession. Only when the group of similarly educated individuals organizes to capitalize on its superior knowledge by claiming prerogatives which are recognized and sanctioned by the proper authority do we have a profession.

HENRY J. MALSBERG

The master craftsman of the medieval guilds dealt directly with his customers. He was not equipped to operate on a large scale which doomed him to virtual extinction with the dawn of the industrial age. In contrast, the practitioners of the learned professions continued to serve their clients as in medieval times and thus contributed materially to the perpetuation of licensing.[1]

Forestry has all the attributes of a "learned profession" because it is based on an organized body of knowledge and identified with a group of similarly educated persons who practice as individuals. When this group is legally recognized by the proper authority, usually the state government in our country, and granted certain privileges it may be said to be a "learned profession." Only in three states, Alabama, Georgia, and Michigan does it so qualify today.

Why Licensing

Licensing is usually initiated by the licensees as a means of maintaining or improving their services and as a means of protection against incompetent competition. But licensing does not always originate in this manner. A benevolent state may invoke licensing as a means of protecting the citizens against incompetent and unscrupulous practitioners. As governmental activities expand, protective licensing increases correspondingly. In summary, the principal purpose of licensing is public protection. In the process, licensees stand to benefit by increased prestige and freedom from incompetent and unscrupulous competition.

Perhaps the most difficult aspect of registration and licensing is concerned with defining the profession. The definition is extremely important for it largely determines those eligible to apply for registration and licensing. A broad definition will permit the inclusion of peripheral areas. Thus a definition of forestry could be so broad as to include arboriculture, "tree surgery," "line clearance," pomology, and the numerous phases of wood utilization concerned with the processing and manufacture of products. A definition may be so broad as to destroy any professional connotation and thus negate the need for registration and licensing. The definition of a profession should be sufficiently restrictive to clearly indicate without question the nature of the services involved. A definition that differentiates between the profession in question and other related professions serves to strengthen the professional aspects of all professions concerned and makes registration meaningful and desirable from the public viewpoint.

Basic Requirements

Education and experience are the basic requirements for registration in the "learned professions." Graduation from an approved curriculum plus a specified number of years of experience satisfactory to the administering board will qualify for registration under many acts. Others require an examination in addition to or in lieu of the foregoing requirements. Provisions are usually made for persons to qualify by experience alone; this provision is frequently referred to as the "grandfather clause" and is designed to qualify persons long established in the profession but lacking formal technical education. The "grandfather

[1] Reed, A. Z. Origins of licensing in the learned professions. Carnegie Foundation for the Advancement of Teaching. 33rd Annual Report. 1938. Pp. 68-86.

clause" usually expires in a year or two after the enactment of the act in which it appears. It is doubtful that any registration and licensing act could be enacted without this clause.

Boards are usually responsible for determining approved educational curricula. Subject matter which must be included in a curriculum before it can be approved is frequently specified. For example, the Michigan Registered Foresters Act specifies that an approved curriculum must include one 3-credit course in each of the following subjects; silviculture, forest protection, forest management, forest economics, and forest utilization. These courses are considered to be the hard core of professional forestry training and, therefore, essential to an approved curriculum. This requirement, also, recognizes that some degree of uniform training is essential in forestry as in any other profession.

Experience is an important requirement of registration and licensing, for it is through experience that prospective applicants for registration find opportunity to demonstrate their professional skills. Mastery of a body of knowledge is not *ipso facto* evidence of professional competence. The experience requirement is analogous to the apprenticeship of the medieval guilds and the internship of modern medicine.

Evaluating experience is a responsibility of the professional board. The task is relatively simple when the latitude of the profession is precisely defined. Forestry experience is difficult to evaluate because there is no specific and accepted definition of what constitutes the practice of professional forestry. The Michigan Act defines it as meaning "professional forestry services, including but not limited to consultation, investigation, evaluation, planning or responsible supervision of any forestry activities, when such professional service requires the application of forestry principles and techniques." This definition leaves much to be desired because it does not explicitly define forestry. When confronted with this or similar definitions registration boards will generally find it necessary to develop criteria for appraising the experience of applicants. For this purpose the Michigan board considers the practice of professional forestry as being "substantially concerned with the care and management of forest trees in communities on land areas. The whole history of forestry is in consonance with this concept. This does not mean that study, care, and treatment of individual trees is excluded from consideration. Forest pathologists, entomologists, and silviculturists are deeply concerned with such matters. But it does mean that these activities must have substantial connection to the care and management of trees on considerable areas of land. It also means that experience limited to shade tree or other tree or wood products work, with no areal responsibilities or interests, does not come within the purview of the registration act as drafted."

How much simpler for all concerned if the practice of professional forestry had been clearly defined in the act. Precise definitions are requisites of any well written registration act.

Type of Registration and Licensing

Professional registration and licensing may be either permissive or obligatory. When permissive, registration is at the option of the practitioner, providing, of course, he possesses the necessary qualifications. Permissive registration does not prohibit non-registered persons from practicing. Licensing under the permissive arrangement usually grants the right to use a specific title, such as Registered Architect, Registered Surveyor, and Registered Forester to indicate professional competence. On the other hand, obligatory registration and licensing requires all practitioners to be registered before they are granted the privilege of practicing. Obligatory registration and licensing is to be preferred from the professional viewpoint, since it provides a greater measure of protection to the public and the profession. Permissive registration, being less restrictive, is often preferred by legislatures and is the type most likely to obtain legislative approval.

Conclusion

A learned profession is one founded on a department of learning or science. It lends itself to precise definition in terms sufficiently restrictive to be meaningful without qualification and it enjoys legal recognition through some form of registration and licensing. Forestry possesses all the basic attributes of a "learned profession." Unfortunately, however, an adequate definition of the practice of forestry is lacking and legal recognition is wanting in all but three states. The Society can provide the former and registration and licensing the latter. Then and only then will forestry take its rightful place among the "learned professions."

T. D. STEVENS
Michigan State University

Needs Involved in Registration and Licensing of Foresters

The premise for the discussion that follows is based on four hypotheses. First, there is a need to license every professional forester engaged in the practice of forestry within the United States. This hypothesis is related to the second need, to present honestly and simply the profession of forestry to the public as a prestige profession comparable with other learned and licensed ones. This hypothesis in turn leads to the third. A need to provide protection for the public and create public confidence in the integrity and ability of the forester has developed. Finally, the fourth hypothesis. The need today is greater than ever that the forester apply the best knowledge, competence, and skill to the forest as a resource.

Foresters as professional practitioners will agree that the fourth hypothesis is true. They also want the public to have confidence in their integrity and ability. They want the prestige of other learned professions. It therefore follows that registration can be the common denominator of the hypotheses cited in the premise.

Protection of the Public

The primary objective of "permissive" type legislation is protection of the public. Any person who secures the services of a registered forester has the satisfaction of knowing that this forester had to qualify under a state law. The public, therefore, is offered protection against incompetent services. Protection is legally provided through registration legislation.

Protection of the Profession

The title forester must have professional connotation in the minds of the public. It must be comparable with doctor, lawyer, and engineer. The meaning of the title forester, and the prestige due it, are not recognized by the average person. Securing understanding and acceptance of the title forester is not enough. Foresters must also work for full recognition of the professional level of their services. The profession has already lost to other groups many of the rights and privileges that it should enjoy. This situation becomes evident as one studies state laws affecting buying and selling of forest lands, land surveys, and treatment of trees where insect or disease damage is to be corrected. A few citations of state laws that can limit the services normally rendered by a forester are summarized as follows:

It shall be unlawful to engage in

the business of a real estate broker who for a fee lists, sells, purchases, exchanges, rents, leases real estate or negotiates any real estate transaction without a license.[1]

It shall be unlawful for any person to practice or to offer to practice land surveying or to use in connection with his name any title tending to convey the impression that he is a land surveyor, unless such person has been duly registered. The term land surveyor means a person who engages in the practice of land surveying and includes surveying of areas for their correct description or for the establishment or re-establishment of land boundaries.[2]

Before any person engages in professional services, including entomological work, pathological work, or tree surgery, he must obtain an annual permit. The permit covers such things as receiving fees for advice or prescriptions related to the control or eradication of any insect pest or plant disease, including spraying. Similar services for pruning shrubs and trees, are covered by the permit.[3]

Protection of the Forester

As foresters we use a number of titles. Among ourselves we refer to the graduate forester, the professional forester, and the registered forester, knowing the full meaning of these titles. The public, on the other hand, has only recently come to recognize the title, forester. It is rather late for this to happen. Some businesses have been quick to realize the advantages of advertising to the public that they have a "forester" on their staff. This man has been in many cases an experienced timber cruiser, sawmill man, or someone experienced in the business of buying and selling land and timber over a long period of years. The time has come when the man with professional training and experience must be differentiated from the technician. Registration offers one solution to this problem.

Registration alone will not guarantee protection to the individual forester unless he abides by a code of ethics. Codes have been developed by the Society of American Foresters and by state boards of registration for foresters. Professional conduct by the registered and licensed forester should bring further protection to the individual.

Registration and Licensing Needs

Licensing, by Georgia since 1951, by Michigan since 1955, and by Alabama since 1957, has pointed up some of the needs that must be met if the public, the profession, and the individual are to be protected. Within the broad concept of registration and licensing, three specific needs must be met. First, there is a need for strong leadership in the registration field. Second, this leadership must devote time to studying and to drafting registration legislation. It must study and recommend amendments once state laws are enacted. Third, an action program must materialize.

Leadership.—More than one-fourth of the states in our nation have or are seeking registration laws for foresters. This indicates a strong demand for leadership in the registration and licensing field. Leadership must be provided by the Society of American Foresters. This implies that members of the profession must serve at the national level, at the Section level, and, most important of all, at the state or Chapter level. A few of the more significant ways in which this leadership can be effective will be brought out by the next speaker.

Study.—Two services in the field of foresters' licensing must be rendered as a by-product of systematic study. First, national leadership should develop guides for states seeking licensing laws that will offer maximum promise of successful legislation. Second, both national and state leadership should help develop definitions that will bring preciseness to laws in the field of foresters' registration.

Experience gained by the three licensing states indicates that certain steps must be followed in drafting bills and that certain support must be enlisted prior to the introduction of a bill to a state legislature.[4] A national committee of the Society of American Foresters could obtain from the three licensing states guides to the steps found necessary in getting bills enacted, or amended. States now considering registration legislation should be guided by the findings of this committee.

The licensing states have encountered three major weaknesses in original legislation that should concern all professional foresters. There is an urgent need for a legal definition of the "practice of forestry." A second need is for a definition of the qualifications that must be met prior to registration. Although state laws now spell out how one may qualify for registration, considerable leeway exists for interpretation by state boards. The third need, encountered by two of the three licensing states because they are located adjacent to one another, is a clarified and uniform definition of reciprocity. As additional states pass registration legislation, the problem of granting reciprocity can become complex to the point of being unworkable. This problem has been solved by other professions. Leadership from a national committee could make a study of this matter, and should draft guides for states to follow.

Finally, a systematic study of registration procedures and problems should result in the drafting of a model bill. Such a bill would be of material assistance to states now in the process of developing registration legislation.

Action.—An action program, the by-product of study by state, regional, and national Society committees, is needed both before bills are submitted to state legislatures and after legislation is passed. Since most bills provide that the local Chapter, Society of American Foresters, shall recommend to the governor names of qualified Chapter members to serve as board members, the state Chapter has a unique obligation and responsibility in the field of licensing. This suggests that state Chapters should have legal status. The State Board of Registration for Foresters in Alabama feels that the Alabama Chapter should be incorporated under State law.

It is the author's personal feeling that licensing of professional foresters by registration under state laws must progress in the following sequence:

1. The first bill submitted to the state legislature must be a "permissive" one.

2. Once passed, a "permissive" law should be amended from time to time to refine definitions and qualifications for registration. This would result in what might be called a "semi-mandatory" law, such as is now in force in Georgia.

3. The final step, but one tried first by some states without success, is the "mandatory" law that would require all persons registered and licensed to be professionally qualified through education.

A careful study should be made, under professional leadership, of registration procedures now followed by other licensed professions. It should provide the information that will ultimately determine the advantages and disadvantages of granting registration to foresters either by education alone or by education plus examination.

[1] Act No. 422, Alabama Law, October 1951.

[2] Code of Alabama, 1940, Title 46, Chapter 7, as amended by Act of the Legislature—Approved July 1943.

[3] Code of Alabama, 1940, Title 2, Chapter 7, as amended by Act No. 873 of the Legislature of 1953.

[4] DeVall, W. B. Professionalism and foresters' licensing. Jour. Forestry 57: 720-723. 1959.

Summary

It has been the purpose of this discussion to bring before a national meeting of the Society of American Foresters some of the needs of states considering licensing legislation, as well as some problems encountered by licensing states. A further purpose has been to point out that, if the best knowledge and skill of the professional forester is to be applied to the forest resource, the public must have confidence in the integrity and ability of the forester and must know that he renders his services as a representative of the licensed profession. Registration and licensing have been suggested as one means of bringing prestige to the forestry profession. It is hoped that the Council, Society of American Foresters will be challenged to appoint a standing committee on professionalism and registration. Such a committee would materially assist both states contemplating licensing and states that already have registration laws. Such a committee should look to the future and begin to chart the course that the profession of forestry should follow if it is to attain and retain its rightful place among the licensed, learned professions.

W. B. DEVALL
Auburn University

Experiences Involved in Registration and Licensing of Foresters

Any time those in a democracy delve into the realm of a new type social legislation, they are going to have experiences. Some of these experiences can be predicted, the predictions being based upon similar experiences in like legislation; others are new and independent of anything heretofore observed. I will confine my remarks to those experiences which I believe will be of value when you decide to embrace licensing of foresters in your respective states. I shall attempt to keep my remarks in a somewhat chronological order from the beginning of licensing foresters in Georgia to the present, selecting the key experiences in each of five categories.

1. *Experiences before and during the passage of the law.* We knew that the public would have to be educated to the acceptance of registration and licensing of foresters. We did not realize the extent to which it would be necessary to educate our fellow foresters, nor did we anticipate that the kernels of greatest resistance would come from within our own ranks of foresters. Likewise, we did not know that our strongest support would come from interested laymen.

When we did recognize the core of resistance within our own ranks, we were totally unprepared for that same group to be among the first to apply for licensing under the permissive type of legislation originally adopted in Georgia.

Because of the necessity for educating the public to registration and licensing, we found it to our advantage to initiate licensing and registration on a voluntary basis, commonly called permissive legislation. Eight years later, in 1959, we adopted compulsory legislation. I am convinced that we could not have passed a compulsory law as an original measure. Experiences in other states, which have attempted (without success) to initially pass compulsory licensing of foresters laws, tends to validate our own conviction: That licensing of foresters must be a progressive undertaking, and that initial compulsory enforcement of social legislation is no more satisfactory in the field of forestry than it is in other categories.

2. *Experiences with the public.* Our experiences with the public have been very satisfactory. Once the public understood that registration and licensing were for their benefit, and their protection, they not only accepted but demanded them. This demand, of course, did not come all at once. It is still expanding and is largely the result of judicious use and display by registered foresters of the licensing certificate, card, and seal.

3. *Experiences with other professional persons.* Licensing in Georgia has placed the forester on a plane of equality with the other professions, and in so doing has increased the professional status of the forester in the eyes of the other professions. This has been particularly true with regard to the legal profession, who in many instances have used the license of a forester to good advantage to impress the court with the weight of the forester's testimony.

4. *Experiences with those who are registered.* During the eight years Georgia foresters were licensed under a permissive licensing law 390 foresters were granted licenses. At the end of this period 227 foresters were licensed. This indicates that 163 foresters did not renew their licenses in Georgia. Not all of these, however, dropped from the rolls of licensed foresters. There were many foresters having residence outside of the State of Georgia who were licensed in Georgia. Before Michigan and Alabama passed licensing laws for foresters, Georgia licensed a considerable number of foresters from Alabama and several from Michigan. Most of these are now, of course, licensed in their home states. In addition to these deletions from the Georgia rolls, there have been a number who have died; some who have moved to areas where licensing was not emphasized or required; some who changed employment status; and some who just dropped out of registration. At the present time there are 278 licensed foresters on the Georgia rolls, from 12 states and one foreign country.

With the passage of the amended licensing law, in 1959, which makes licensing a compulsory adjunct to the practice of forestry, in most instances, interest in licensing among those who are qualified to practice has greatly increased. And although the licensing board has been decidedly lenient up to this time, there is every indication of a stiffening attitude toward those who are remiss in their licensing obligations.

One interesting experience with licensing of foresters in Georgia has to do with the granting of licenses by the passing of an examination. Early in the life of the law it was anticipated that many who could not qualify otherwise would attempt to become licensed in this manner. Few did; a very small minority of those who applied for the examination were able to pass it. The examination was difficult, but not impossible. No doubt any newly graduated forester could have passed it. Apparently few nonforesters are interested in becoming licensed foresters if it requires mental effort.

One of the most gratifying aspects of licensing is the emphasis placed on licensing by the forest industry. Several forest industries in Georgia boast that their forester personnel is 100 percent licensed. Some go so far as to pay the annual registration fee for their personnel.

5. *Experiences with other states that have forester registration laws.* Since only two states other than Georgia have forester registration and licensing laws, experiences with other states have been limited. Because of the proximity of Georgia and Alabama there has been more experience gained in the interaction of two similar laws between these two states than between Alabama and Michigan, or Georgia and Michigan. The largest area of

experience comes, of course, in the field of reciprocity. Members of the Georgia and Alabama Boards of Registration have met for the purpose of reaching an amicable agreement in regard to conditions of reciprocity arising from similar laws, but different interpretations.

The Alabama Board adheres to the policy that if a resident of Alabama is licensed in another state he will not be given reciprocity; if he is a new resident of Alabama and is licensed elsewhere, he will be given reciprocity until his license expires; but if he is a resident of a state which does not license foresters only a license from Alabama will be recognized.

The Georgia Board states that if a forester is licensed in another state, that license is *primafacie* evidence of his qualification to be registered, and he need furnish no further proof. He must, however, obtain a Georgia license before beginning his practice in Georgia.

There is, no doubt, something to be said for both viewpoints. Time will allow us to decide which is the better of the two.

Finally, the question of the difficulty of obtaining a license in one state as compared with another, with the resulting complexities of reciprocity, will eventually arise. For example, at the present time it is impossible, in Georgia, for a non-forester to become registered. If another state were to allow non-foresters to become registered under a "grandfather clause," should Georgia recognize the license? Should non-foresters of another state be given preferred treatment in this manner over the non-foresters in Georgia? Should a non-forester in Georgia, who cannot become registered under the Georgia law, be allowed to register in another state and then transfer his registration back to Georgia under the reciprocity clause?

There are many experiences yet to be met, but progress has been made, and the benefits of registration and licensing in Georgia, Michigan, and Alabama far outweigh the problems.

A. E. PATTERSON
University of Georgia

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Report of the Division of Silviculture

The 1959 annual meeting of the Division of Silviculture was held in the morning and afternoon of November 17.

Chairman William H. Cummings turned the morning session over to L. E. Chaiken and the afternoon session to John W. Duffield. Attendance ranged from 150 to 200 during the two sessions.

During the day nine technical papers were presented by the following authors: I. T. Haig, Thomas Lotti, Clifford E. Ahlgren, Clive M. Countryman, P. E. Hoekstra, Robert Z. Callaham, Charles A. Wellner, Henry Helmers and James Bonner, and Harry A. Fowells.

John F. Shanklin presented the report of the SAF Committee on Natural Areas and R. T. Pingham gave the report of the SAF Committee on Forest Tree Improvement. Both of these reports follow.

On November 13 and 14 a special meeting was held at the Institute of Forest Genetics, Placerville, Calif. On the first day the group toured the buildings and grounds at the Institute and then made a bus trip to visit examples of hybrid pine outplantings. The second day was devoted to presentation of 10 semiformal research papers in forest genetics before the Joint SAF Committee on Forest Tree Improvement—Western Forest Genetics Association. Abstracts of these papers will be published in the 1959 *Proceedings*.

A nominating committee consisting of Russell K. LeBarron, chairman; Harry A. Fowells; and L. E. Chaiken presented nominations for Division officers for the coming year consisting of:

Chairman — Jesse H. Buell, Yale School of Forestry, New Haven, Conn.

Vice-Chairman — Paul O. Rudolf, Lake States Forest and Range Experiment Station, U. S. Forest Service, St. Paul, Minn.

Secretary—Frank W. Woods, School of Forestry, Duke University, Durham, N. C.

The nomanitions were unanimously approved by the Division.

GILBERT H. SCHUBERT
Secretary

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1959 Report of Committee on Natural Areas

It is a real pleasure for me to present this year's report of the Committee on Natural Areas. Those of you who have followed these annual reports must have noted from time to time a note of pessimism as to the effectiveness of the Committee's efforts. However, let me quickly disabuse you of the idea that this report is going to be a wildly optimistic one. Such is not the case, but your Committee has worked hard this year and we do believe that real progress has been made.

Committee Membership

It is good news to report that one of our original Committee members has returned to active service with the Committee. Neil W. Hosley has consented to assist us again and he has been most helpful during the past few months. The Committee now consists of Richard E. Griffith, chief, Division of Wildlife, Bureau of Sport Fisheries and Wildlife, Portland, Ore.; Ivan H. Sims, staff assistant for research, Forest Service, Washington, D. C.; Neil W. Hosley, chairman, Department of Forestry, Southern Illinois University, Carbondale, Ill., and John F. Shanklin, forester, Technical Review Staff, Department of the Interior, Washington, D. C.

Liaison Officers

There have been some changes in the liaison officers. You will recall that each Section has, or is supposed to have, a liaison officer working directly with the national committee. Norman Smith, staff forester, Michigan Department of Conservation, now represents the Wisconsin-Michigan Section. Charles A. Wellner, Intermountain Forest and Range Experiment Station represents the Intermountain Section. Ray Boyd, Inland Empire Research Center, represents the Inland Empire Section. Charles H. Driver, director of forest research, International Paper Company, represents the Southeastern Section. Martin B. Applequist, associate professor of forestry, Arizona State College, now represents the Southwestern Section. As of this moment only the Appalachian Section is without a liaison officer, Clarence Korstian having requested that he be relieved of this responsibility.

Gain and Loss of Areas

We are indeed sorry to report the loss of four natural areas during the year. The Wychwood Natural Area in Wisconsin, formerly owned by the University of Chicago, has been disposed of by that institution and apparently the area can no longer be classified as a natural area. The Blacks Mountain Experimental Forest Natural Area in California should never have been listed. Lobster Creek Natural Area in Oregon has been withdrawn in the interest of an exchange by the Forest Service, and the Moqua Natural Area in Wisconsin was dropped

as not qualifying under the Society's definition of a natural area.

However, seven areas have been approved for listing during the year. Five of these are located in New York State.

1. Wolf Pond Natural Area, Adirondack Forest Preserve, SAF Type No. 21, white pine.
2. Five Ponds-Wolf Pond Natural Area, Adirondack Forest Preserve, SAF Type No. 30, red spruce-yellow birch.
3. Totten Natural Area, Adirondack Forest Preserve, SAF Type No. 31, red spruce-sugar maple-beech.
4. Plateau Mountain Natural Area, Catskill Preserve, SAF Type No. 33, red spruce-balsam fir.
5. Slide Mountain and Cornell Mountain Natural Area, Catskill Preserve, SAF Type No. 33, red spruce-balsam fir.

Two areas are within the Olympic National Park.

1. Hades Creek Natural Area, SAF Type No. 226, Pacific silver fir-western hemlock.
2. Hegley Creek Natural Area, SAF Type No. 224, western hemlock.

Under consideration by the committee for approval as to listing were approximately 20 different areas as the year closed.

Research Survey

During the year a review was initiated to ascertain the actual research under way on all natural areas. This survey is now nearing completion and a report thereon will be issued next year as a part of our report to the Society during its 60th anniversary.

In connection with research, the committee has been disturbed from time to time by suggestions that if active research is not underway at a natural area it should be removed from the approved list. The committee has always resisted such suggestions and has received support from the agencies administering natural areas. I would like to quote from an internal memorandum of May 25, 1959, issued by assistant chief Edward P. Cliff of the Forest Service.

> I most emphatically do not agree with the implication * * * that if a Natural Area is not used for experimental purposes it should be abandoned. A Natural Area does not have to be used for experimental purposes to have value. It can have high value just as a preserve for observation purposes. If we do not set aside and protect natural areas now we will not have them when we do need them for scientific purposes. It will be more difficult to set natural areas aside in the future as we progress along the road of more intensive land management.
>
> I would not consider abandoning any natural area we now have unless investigation shows: (1) It is not in fact a good representative of natural conditions or a distinct vegetative type; (2) unnatural influences have so modified it as to destroy its value; or (3) we have adequate representative samples of the type preserved in other protective reservations which make preservation of a particular area unnecessary.

New Listing of Natural Areas

A survey is also in process to permit us to issue a new list of all approved natural areas next year. This new list will provide the same data as heretofore listed, and in addition will include the average age of each type, average height and diameter of the major species in each type, the range in elevation of the natural area, and a statement as to the geology and topography of each area.

Special Southeastern Survey

It has already been reported in the JOURNAL OF FORESTRY that Resources for the Future had granted the Society $7,000 for a field investigation to endeavor to locate new natural areas in the southeastern states. The Committee feels that it should summarize briefly this project so that the objectives of the survey will be more thoroughly understood.

First, we should bear in mind that the Society has defined a natural area as "an area set aside to preserve permanently in unmodified condition a representative unit of the virgin growth of a major forest type primarily for the purposes of science, research, and education. Timber cutting and grazing are prohibited and general public use discouraged."

Second, the Committee on Natural Areas has indicated that a natural area should be not less than 10 acres and then only if it is surrounded by an equal acreage to constitute a buffer zone. Furthermore, the Committee has provided that protection should be of a permanent nature which may be either through an act of legislation, regulation, endowment, trust, will, or otherwise.

The Committee has for over 12 years operated by means of correspondence and publication of papers in the JOURNAL OF FORESTRY and the *Proceedings* of annual meetings. It has canvassed every state forestry organization, every forestry school or college and every federal forest land managing agency. It has processed during the past 12 years many hundreds of proposals for natural areas. As of this date it has located in the seven southeastern states only 17 of the 59 forest types present in that area. Many of the very highly important types are not represented and the State of Tennessee has not a single natural area.

Because of the lack of suitable natural areas and because of the belief that the possibilities of accomplishment solely through correspondence had been exhausted, the committee proposed that a field canvass be undertaken. This proposal having been approved by the Council of the Society, a petition was submitted to Resources for the Future. As a result $7,000 has been provided to carry on a field survey with a view to locating prospective natural areas in the states of North Carolina, South Carolina, Tennessee, Georgia, Florida, Alabama, and Mississippi (excluding the bottomland forests of the western part of Mississippi and Tennessee).

Francis H. Eyre, formerly chief of forest management research, Forest Service, now retired but presently part-time staff employee of the Society, has agreed to undertake the project. As the expiration for the grant is May 31, 1960, the Committee approved the following time table for the conduct of this project.

1. Completion of a preliminary better canvass of all posible sources in the Southeast by September 15, 1959
2. Completion of first field trip by October 15, 1959.
3. Completion of all subsequent field work by April 1, 1960.
4. First draft of the report to be completed and in the hands of the Committee by April 15, 1960.

I am pleased to be able to summarize Eyre's report of progress as of the end of October. Following considerable correspondence, interviews with 43 people who have had field experience in the Southeast, and at the completion of an 1,800 mile field trip, Eyre has received 96 suggestions as to possible natural areas. Most of these proposed areas have not as yet been inspected, however, Eyre reports that of the areas inspected four will be recommended for inclusion in the Society's list of natural areas. Two of these are located in Tennessee and two in North Carolina. He concludes his report by saying, "If the results to date are an indication of what to expect during the remainder of the survey I am hopeful that quite a number of satisfactory areas can be brought to light."

The Committee sincerely hopes that this southeastern survey may be so

successful in locating prospective natural areas that the Society may be armed with sufficient information to enable it to obtain additional grants from other foundations for comparable surveys in other regions of the United States.

JOHN F. SHANKLIN
Chairman

Report of the Committee on Forest Tree Improvement

The Committee on Forest Tree Improvement was organized in 1954, and since that time has been active in areas of general interest in forest genetics research. It has sponsored several publications, largely directories to forest genetics research, and educational facilities, and bibliographies of literature in forest genetics.

Currently, the Committee is working on a comprehensive, worldwide directory to forest genetics research and research workers. The list will include more than 600 names, and will be indexed by workers and subject matter. Publication details are not yet resolved, but the directory should be ready for publication early in 1960.

The Committee's "Glossary for Forest Tree Improvement Workers," edited by Bayne Snyder, was published in 1959 by the Southern Forest Experiment Station. Copies are now available from the Southern Station; shortly they may also be obtained through your local tree improvement comitteeman. More than 150 commonly used tree improvement terms are defined for the practicing forester.

At the request of Hugh A. Inglis, chairman of the Seed Certification Committee of the International Crop Improvement Society, a new subcommittee on Seed Certification has been established within the SAF Committee on Forest Tree Improvement. Subcommittee chairman is A. E. Squillace of Lake City, Fla., and subcommittee members are R. G. Hitt, Minnesota; W. B. Critchfield, Massachusetts; and A. L. Orr-Ewing, British Columbia. The immediate function of this new Seed Certification Subcommittee was to have been working with the International Crop Improvement Society in studying and making proposals as to simple minimum and maximum standards for forest tree seed certification. Other regional tree improvement committees were also alerted early in 1959 and thereafter stood ready to assist in shaping simple minimum and maximum tree seed certification standards. Unfortunately few if any of the tree improvement committees, including this committee, were again contacted—apparently due to deadlines imposed by the earliness of the International Crop Improvement Association's board of directors meeting, Tulsa, Okla., October, 1959. While this committee is certain that no slight of the SAF or regional tree improvement committees was intended, we do feel that minimum certification standards for forest tree seed should reflect countrywide experience and approval. Since it is our understanding that the International Crop Improvement Association's "Minimum Certification Standards for Forest Tree Seed," as approved by their board of directors, may be published shortly, we recommend that such publication be withheld to allow their review by national and regional tree improvement committees. This recommendation will be forwarded to Mr. Inglis.

Recent proposals concerning changes in the Oxford Decimal System sections dealing with the rapidly expanding field of forest genetics were also considered by the S.A.F. Committee on Forest Tree Improvement. Recommendations will be forwarded to the joint FAO/IUFRO Committee on Bibliography.

At last year's meeting a proposal was made that a day of the Committee meeting be given over to presentation of semi-formal research papers. Following this suggestion, the Committee met jointly with the Western Forest Genetics Association at the Institute of Forest Genetics, Placerville, Calif., November 13 and 14, 1959. Ten semi-formal research papers were presented. Subjects covered included biosystematics of ponderosa pine, variation in crown form attributes and provenance studies in Douglas-fir, physiologic basis of racial variation in southern pines, seed orchard problems and yields, heritability of height growth rate in western white pine, variation in aspen species, timing of pollen application in relation to seed yield in eastern white pine, and production and dispersal of pollens of various British Columbian conifers. Abstracts of these 10 papers will appear in the SAF *Proceedings*.

The Committee hopes to continue work on various general problems affecting forest genetics and foresters alike. We invite inquiries concerning problems in forest genetics and will attempt to answer them promptly.

W. B. CRITCHFIELD (Northeast)
R. G. HITT, (Lake States)
A. L. ORR-EWING (Canada)
H. B. KRIEBEL (Central States)
E. B. SNYDER (South)
A. E. SQUILLACE (Southeast)
R. T. BINGHAM, *Chairman*

Report of the Division of Forest Products

The 1959 meeting of the Division of Forest Products was opened at 9:00 a.m., Tuesday, November 17. Chairman Bernard M. Granum opened the session with 250 in attendance. The technical program consisted of the following papers and three periods of lively questions and discussions:

1. "Wood at Its Apogee?" Fred E. Dickinson.
2. "Utilization from Forest to Finished Products." Richard D. Roseberry.
3. Panel Discussion: "Log Grading and Utilization."

"The Overall Picture." C. R. Lockard.

"Considerations Basic to Timber Quality Evaluation Systems." C. A. Newport.

"Does Site Affect Grade Yield?" Robert A. Campbell.

"Specific Gravity—A Measure of Intrinsic Timber Quality." E. M. Mitchell.

"Hardwood-Softwood Quality Relations." J. A. Putnam.

4. "Redwood . . ." Nicholas V. Poletika.

The business meeting was called to order at 11:45 a.m. Chairman Granum stated that the Committee on Log Grading for the Society had been appointed and is composed of the following members:

C. R. Lockard, chairman; Henry Wershing; V. W. Cothern; George Stenzel; Woodrow W. King; Oliver P. Wallace; Elbert C. Cleveland; John Putnam; Thomas Orr; Ed Zaidlicz; and Robert M. Kolbe.

Frank Kaufert, chairman of the Nominating Committee, presented the slate of candidates for offices of the Division of Forest Products for the coming year, as follows:

Chairman—Rudolph F. Grah, University of California, Berkeley.

Vice-Chairman—Harvey D. Erickson, University of Washington, Seattle.

Secretary — Raymond Wood, Diamond-Gardner Corp., Cloquet, Minn.

There were no nominations from the floor. A motion to close the nominations was passed. A motion to cast a unanimous ballot also passed.

A report on the meeting of the Log Grade Committee held on November 15 at the Sheraton-Palace was given by C. R. Lockard, chairman. Eight

of the eleven members were in attendance. The Committee recommended that (1) a list of discussion topics on the probem be prepared and have the Society use the list as a source of program topics for the Section meetings for the coming year; (2) include in that list requests for answers to the problems that have been raised. The Committee felt that it could serve a useful purpose to the Society even though its line of action is not yet clear.

HARVEY D. ERICKSON
Secretary

Report of the Division of Forest Recreation

Over 300 people attended the meeting of this division, held on the morning of November 17.

The keynote speaker, Newton B. Drury, former chief of the National Park Service and recently retired chief of the California Division of Beaches and Parks, discussed problems of recreation.

A panel, "Recreation Across the Nation," discussed progress across the nation. Lawrence C. Merriam, regional director of the National Park Service at San Francisco, covered the 13 western states.

M. M. Nelson, regional forester for the U. S. Forest Service illustrated his report on the Central States with slides.

Charles H. Stoddard, Jr., of Resources for the Future, reported the progress for the eastern states.

Assistant regional forester W. S. Davis, U. S. Forest Service, San Francisco, gave an illustrated report on Squaw Valley and the 1960 Winter Olympics.

Richard D. Lane, assistant director of the Division of Forest Management Research outlined the recreation research program being started at the Northeastern Forest Experiment Station.

At the business meeting, the following officers were elected:

Chairman—William A. Parr, Maryland Dept. of of Forests and Parks, Bel Air.

Vice-Chairman—Henry A. Harrison, U. S. Forest Service, Washington, D. C.

Secretary—Lemuel A. Garrison, National Parks Service, Yellowstone National Park.

WILLIAM A. PARR
Acting Secretary

Report of the Division of Economics and Policy

Chairman John A. Zivnuska called the business meeting of the Division of Economics and Policy to order at 4:45 p.m., November 7, following a well attended technical session. Approximately 45 members were present.

The acting secretary read the Report of the Committee to Compile a Directory of Workers in the Economics of Forestry. The directory was published in the September 1959 issue of the JOURNAL OF FORESTRY. It included 317 workers in the economics of forestry. Expenses of compilation and editing, including necessary secretarial services and supplies were underwritten by Yale University. The committee recommended that the directory be reviewed at some future time to keep it up-to-date. The report was accepted by the Division. In discharging the committee, Chairman Zivnuska expressed the appreciation of the membership for the valuable service and directory completed by David M. King, Lee M. James, George R. Armstrong, and Albert C. Worrell, chairman of the Directory Committee.

Carl Stoltenberg, chairman of the Nominating Committee, presented the committee's slate of candidates for division offices and Executive Committee.

Chairman—H. R. Josephson, U. S. Forest Service, Washington, D. C.

Vice-Chairman—G. Robinson Gregory, University of Michigan, Ann Arbor.

Secretary—Henry H. Webster, Northeastern Forest Experiment Station, Upper Darby, Pa.

Executive committee member for 3 years—W. S. Bromley.

Executive committee member for 2 years—James T. Morgan.

Ronald I. Beazley nominated James T. Morgan and I. Irving Holland for office of Secretary. It was moved and seconded that nominations be closed and a unanimous ballot be voted for all candidates except those for office of Secretary. Motion was passed. Henry Webster was elected Secretary by ballot. Other continuing members of the Executive Committee are John R. McGuire and John A. Zivnuska, who will each serve for one year.

Henry Clepper explained circumstances underlying the inadequate seating capacity for the Division's formal program. It was commented from the floor that in at least two of the last three annual meetings the seating capacity had been significantly inadequate to accommodate the audience wishing to hear the Division program. The acting secretary estimated seating capacity at 300-350 for the 1959 meeting with at least 50 members standing at the sides, back and entrances to the assembly hall.

Chairman Zivnuska called for further old business and then for new business. No further business was presented.

JOHN FEDKIW
Acting Secretary

Report of the Division of Forest-Wildlife Management

The 1959 meeting of the Division of Forest-Wildlife Management was held during the afternoon of November 17. Chairman Lansing H. Parker presided.

The following papers were presented:

1. "The Long-Range Wildlife Management Program of the U. S. Forest Service." Lloyd Swift.
2. "The Problems in the Use of Systemic Rodenticides." Nelson Kverno.
3. "Use of Radioactive Scandium 46 to Determine Seed Losses by Animals." William Lawrence and J. H. Rediske.
4. "Prescribed Burning and Other Methods of Deer Range Improvement in Ponderosa Pine in California." Harold H. Biswell.
5. "The Effects of Current West Coast Logging Practices upon Fisheries Resources." Willis Evans.

At the close of the technical session a short business meeting was conducted.

The chairman asked for suggestions as to subjects for the 1960 meeting. One suggestion was made—a panel discussion on "facts of life"—big game management.

William Lawrence announced plans for a work conference for professional biologists working in the field of forest damage from wildlife. Tentatively, the conference has been scheduled for January at the Weyerhaeuser Forestry Research Center, Centralia, Wash. and would be of interest to foresters from Washington, Oregon, British Columbia, Idaho, and Montana.

The need for better coordination of forest-wildlife research was discussed, pointing up success from coordination in the fields of pathology and entomology.

HOWARD A. MILLER
Secretary

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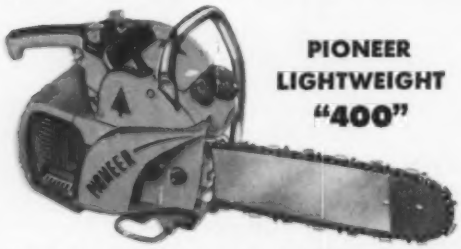

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Report of the Division of Forest Management

The Division of Forest Management held an all-day meeting on November 18. The morning was devoted to a symposium on "Predicting Forest Growth and Calculating Allowable Cut," the afternoon to individual papers and the annual business meeting.

The following officers were elected:

Chairman—Thomas B. Glazebrook, U. S. Forest Service, Portland, Ore.

Vice-Chairman—Frank D. Irving, Jr., University of Minnesota, St. Paul, Minn.

Secretary—William J. Bridges, Jr., Union Bag-Camp Paper Corp., Savannah, Ga.

An award for valor was presented to Thomas J. Kennelly by DeWitt Nelson, director, California Department of Natural Resources, and Past President of the Society of American Foresters, during the afternoon program.

A new task was assigned to Division by the Council. On November 15, the Council approved and referred to the Division a request by Council Member Kenneth P. Davis to study "Standardization of Cubic Foot Tree Measurement."

RUSSELL K. LEBARRON
Chairman

Presentation of Citation and Medal of Valor Pin

"On June 22, 1959, forest firefighter Thomas J. Kennelly, then employed by the California Division of Forestry at the Paso Robles Forest Fire Station, was a member of a crew responding to a grass and brush fire burning about ten miles east of Paso Robles. Upon arrival at the fire, the crew was assigned to and immediately attacked the head of the fire. At approximately 4:00 p.m. there was a sudden blow-up, which compelled Kennelly and his foreman, Leo L. Boyd, to return to the cab of the fire truck in order to escape direct exposure to the flame. After the fire passed over the truck Boyd and Kennelly, because of the heat and lack of oxygen, were forced to leave the truck and go through the flames into the burned area. At that time Kennelly had received flash burns about his face. Soon after leaving the truck Kennelly found that Foreman Boyd's clothing was on fire. He immediately went to Boyd's assistance attempting to extinguish the fire by tearing off Boyd's

clothing with his bare hands. He eventually succeeded in this with great difficulty and exposure to himself. Because of Kennelly's action he received extensive third-degree burns on his hands. For sometime the doctors thought he would suffer the loss of his fingers on both hands. We are happy to report that Kennelly will retain all of his fingers.

"On behalf of Governor Edmund G. Brown, Thomas J. Kennelly, in the highest tradition of California Division of Forestry Service, is herewith awarded this Citation and Medal of Valor Pin for heroism above and beyond the call of duty."

DEWITT NELSON, *Director*,
Department of Natural Resources,
November 18, 1959

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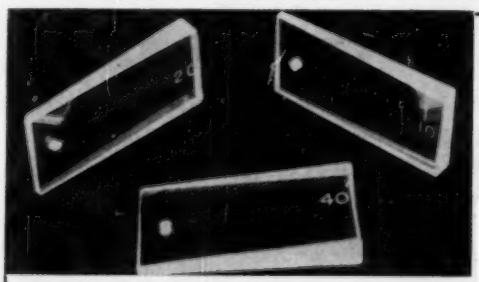
Report of the Division of Education

The annual meeting of the Division of Education was held on Wednesday morning, November 18, with between 50 and 100 members in attendance.

The subject "Identifying and Guiding Future Forest Researchers" was introduced by Chairman Peter W. Fletcher and discussed in a series of papers. Robert E. McDermott and William T. Nearn considered the problem from the standpoint of undergraduate training, while John A. Zivnuska presented his views on graduate preparation. In the absence of Scott S. Pauley, Frank H. Kaufert sketched the thinking at Minnesota regarding graduate preparation for research in the field of forest genetics. Thomas F. McLintock spoke of on-the-job training for research as practiced by the U. S. Forest Service.

As the principal item of business, J. Kenneth Pearce, representing the Committee on Safety, presented the "Forester's Safety Code" for the consideration of the Division. After sev-



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eral minor changes suggested from the floor the ereed was accepted by voice vote with the recommendation that it be transmitted to the Council for consideration.

The following officers were unanimously elected for the coming year:

Chairman — William C. Bramble, Purdue University, Lafayette, Ind.

Vice-Chairman—John Carow, University of Michigan, Ann Arbor, Mich.

Secretary — Allen W. Goodspeed, West Virginia University, Morgantown, W. Va.

JOHN CAROW
Secretary

Report of the Division of Range Management

The Division of Range Management held its annual meeting the morning of November 18. Division Vice-Chairman R. M. DeNio presided. Attendance at the meeting was estimated to be 175.

Each of the papers presented led to lively discussion and comments from the floor. The session was devoted to presentation of the following papers:

1. "Compatibility of Forage and Timber Production on Ponderosa Pine Lands." Avon Denham.

2. "Role of Grass Seeding in the Rehabilitation of Disturbed Areas Following Logging and Fire." James E. Sowder.

3. "Impacts of Competitive Land Uses on the Production of Adequate Timber Supplies from Private Lands." Paul E. Shively.

4. "Improving Cover on California Rangelands to Meet Increasing Demands for Wildlife and Livestock Forage." E. J. Woolfolk.

5. "California Brushlands: Their Characteristics and Utilization." Arthur W. Sampson.

6. "Planned Burning as a Management Practice for Wild Lands." L. T. Burcham.

Following the presentation of papers a business meeting was held and a slate of candidates for offices in 1960 was presented. Nominations were as follows:

Chairman
1. Reginald M. DeNio
2. Paul C. Lemon

Vice-Chairman
1. Harold Weaver
2. Lowell K. Halls

Secretary
1. Charles Terwilliger, Jr.
2. Hurlon Ray

Voting on the above list of candidates will be made by ballots mailed to Division Members.

KENNETH W. PARKER
Acting for Lowell K. Halls,
Secretary

Report of the Division of Watershed Management

Chairman Sidney Weitzman opened the 9th annual meeting of the Division of Watershed Management at 2 P.M. In keeping with the general theme of the annual meeting, "Forestry and People" a panel program was presented covering the relationships between watershed management and people. The national scene was presented in "The National Water Situation—Today and in the Future" by E. L. Hendricks, the local aspects in "State and Local Activities to Meet Growing Water Needs," by Harvey O. Banks. J. K. Vessey discussed "The Role of Public Forest Land in Watershed Management," and Carl J. Johnson "The Role of Private Forest Land in Watershed Management." The application of current research was described by Marvin Hoover in "Forest Watershed Research—Its Accomplishments and Opportunities." Following the presentation of these papers, written questions that had been prepared by the audience were presented to each of the speakers by the panel moderator, Charles A. Connaughton. Considerable discussion was provoked by these questions, many of which were pointed and difficult to answer. This proved to be a very stimulating meeting.

A short business meeting followed during which a secretary was chosen for the coming year. Other officers advanced automatically from previous positions. The officers for the coming year will be:

Chairman—Jack Rothacher, Pacific Northwest Forest and Range Experiment Station, Portland, Ore.

Vice-Chairman—Paul J. Zinke, University of California School of Forestry, Berkeley.

Secretary—Percy B. Rowe, Pacific Southwest Forest and Experiment Station, Glendora, Calif.

There were approximately 400 in attendance at the meeting; however, the business meeting was conducted by a very small group. The Division wishes to express appreciation to Chairman Weitzman for his work in organizing a successful program.

PAUL J. ZINKE
Secretary

Coming Events

Allegheny Section

Morgantown, W. V., February 11-13, 1960. Theme: "Professional Growth—A Positive Approach."

Ozark Section

Winter meeting in Little Rock, Ark., February 12 and 13, 1960.

Appalachian Section

Winter meeting in Durham, N. C., February 12-13, 1960.

New England Section

The New England Section will hold its meeting at the Statler-Hilton Hotel, Boston, Mass., March 17 and 18, 1960.

Intermountain Section

The Intermountain Section will hold its 8th annual meeting March 26 at Twin Falls, Idaho.

Wisconsin-Michigan Section

The Madison Chapter will be host to the Wisconsin-Michigan Section for the annual winter meeting on March 25-26, 1960, at the Loraine Hotel, Madison.

Southern California Section

The Southern California Section will hold its meeting in San Bernardino, April 1 and 2, 1960.

Ouachita Chapter Organizes

Thirty-three foresters residing in the eastern 10 counties of the Ouachita Mountains of Arkansas formed a local Foresters Group on May 23, 1959. Following organization the group petitioned the Ozark Section of the SAF for membership as a chapter. Chapter formation was authorized on September 21. Present membership numbers 52.

Officers of the new Chapter are: James L. Smith, chairman, Southern Forest Experiment Station, U. S. Forest Service; Robert B. Gierow, vice-chairman, Dierks Forests, Inc., and Ted Chancey, secretary-treasurer, Dierks Forests, Inc.

The purpose of the new Chapter as expressed in the Chapter petition is the promotion of better forestry practices in the Ouachita Mountains; to afford foresters the opportunities to become better informed about local forestry problems; and to promote fellowship among foresters residing in the region.

The Chapter monthly meetings are devoted to formal discussion of the forestry problems of the area and to evaluation of research designed to solve those problems.

Conference on Agricultural Meteorology Scheduled

Through the sponsorship of the American Meteorological Society, a conference on agricultural meteorology will be held in Kansas City, Mo., May 18 and 19.

By invitation, the Society of American Foresters will be represented at

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Every seed put out will come in contact with fresh soil, your plantings will be well spaced, the seed consumption per acre will be approximately one fifth the broadcast method, there is no contact between the treated seed and the operator's hands or body and the reduction in the cost of re-seeding your land is tremendous.

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the conference by William E. Reifsnyder, of the Yale University School of Forestry. Dr. Reifsnyder is associate editor of the JOURNAL OF FORESTRY for forest fire.

Harry Lee Baker (1888-1959)

Harry Lee Baker, 71, died at his home in Jacksonville, Fla., November 28, 1959.

Born February 24, 1888 in Michigan, he was graduated from Michigan State University in 1912 with the B.S. degree in forestry.

Following graduation he was a ranger on the Kootenai National Forest in Montana and from 1918 until 1922 he was supervisor of the Cabinet National Forest.

Leaving the U. S. Forest Service in 1922 he was variously district forester with the Virginia Forest Service and assistant state forester for fire control in North Carolina. He returned to the Forest Service in 1925 on cooperative work with the southern states under the Clarke-McNary Law.

He became state forester of Florida in 1928, a position which he held for 13 years. In 1940 he left Florida to become assistant director of forests in the Office of Land Utilization, Department of the Interior.

During 1943-1947 he was associate state forester of Virginia, and during 1947-1953 he was assistant state forester of West Virginia. Retiring in the latter year, he made his home in Jacksonville, Fla.

D. B. Bonebrake (1907-1959)

Darrell Brown Bonebrake of Bramwell, W. Va., died suddenly on December 2.

Born March 29, 1907 in Waynesboro, Pa., he was graduated from the Pennsylvania State Forest School at Mont Alto in 1929. For the next five years he was a forester in the Pennsylvania Department of Forests and Waters.

In 1936 he was employed by the U. S. Forest Service in West Virginia as a forester with the Civilian Conservation Corps, and in 1941 was appointed assistant state forester in charge of fire control in the West Virginia Conservation Commission. He was advanced to state forester three years later.

Subsequently, he was named forester for the Pocahontas Land Corporation of Bluefield, W. Va., the position he held when his untimely death occurred.

Arthur D. Read (1882-1959)

Arthur D. Read of West Monroe, La., died November 22, 1959.

Born in Quincy, Ill., on October 26, 1882, he received a bachelor of arts degree from the College of Emporia, Kans., in 1903, and the M.F. degree from Yale in 1906.

Entering the U. S. Forest Service in 1906, he rose to the position of supervisor in the Southwest, then entered the livestock industry in 1915 in New Mexico. In 1923 he went with C&A Copper Company in Arizona handling underground timbering.

Two years later he was appointed forester for the Long-Bell Lumber Company serving in California, Washington, and Louisiana. Returning to the U. S. Forest Service in 1933, he established and was superintendent of the Stuart Nursery in Louisiana until 1942 when he transferred to the War Production Board.

Mr. Read retired from government work in 1945, and went into consulting forestry.

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He was author of the book *The Profession of Forestry* published in 1934.

John A. Mitchell (1886-1959)

John Alfred Mitchell of St. Paul, Minn., former staff member of the Lake States Forest Experiment Station, died November 20, 1959.

Born April 1, 1886 in Detroit, Mich., he was graduated from Michigan State University in 1909 with the B.S. degree in forestry. In that year he entered the U. S. Forest Service.

He spent his early career on national forests in the Far West, and then was transferred to Washington, D. C., where he began specialization in fire research.

When in 1923 the Lake States Forest Experiment Station was established at St. Paul, Mr. Mitchell was one of the first foresters assigned to it. During the following 31 years he worked closely with other federal and state agencies to develop improved fire detection and control techniques.

His Lake States fire danger meter is used to help determine manpower and equipment needs. He retired at the end of 1954.

Necrology, 1959

Fellow

Morrell, F. W., Alexandria, Va.

Member

Aufderheide, Robert E., Eugene, Ore.
Baker, Harry L., Jacksonville, Fla.
Blackerby, Alva W., Grangeville, Idaho
Bonebrake, Darrell B., Bramwell, W. Va.
Brown, O. W., Boonville, N. Y.
Cann, James J., Grenada, Miss.
Chapman, Roy A., Washington, D. C.
Eisinger, John H., Savannah, Ga.
Foster, Ralph W., Aiken, S. C.
Grossmann, Herman J. A., Portland, Ore.
Hale, Warren F., Concord, N. H.
Hanson, Frank C., Gainesville, Fla.
Hine, Willard R., Avondale Estates, Ga.
Hult, Gustaf W., Corvallis, Ore.
Jackson, W. E. Jr., Lexington, Ky.
Johnson, Seaborn J., Talladega, Ala.
Jolly, William W., Norris, Tenn.
Juhren, Gustaf, Altadena, Calif.
Kimball, George W., Albuquerque, N. Mex.
Lary, George A., Pine Bluff, Ark.
Loveridge, Earl W., Washington, D.C.
May, Richard M., Willimantic, Conn.
McCormack, James F., Asheville, N. C.
Merrell, John O., Huntington, Pa.
Mitchell, J. Alfred, St. Paul, Minn.
Nelson, Ralph A., Mayfield, Ky.
Pedersen, Arthur H., Seattle, Wash.
Phillips, R. A., Glendale, Ariz.
Phipps, R. H. K., Gorham, N. H.
Read, Arthur D., West Monroe, La.
Rigdon, Harry P., Stillwater, Okla.
Schaeffer, Charles H., Tallahassee, Fla.
Slipp, Albert W., Moscow, Idaho
Slocum, George K., Raleigh, N. C.
Smith, Stanton G., Brunswick, Maine
Strait, H. G., Hyde Park, N. Y.
Thoresen, Carl T., Norris, Tenn.
Tillotson, C. R., Albany, Calif.
Watson, William J., Montgomery, Ala.
Webster, C. B., Alexandria, Va.
Wyckoff, Stephen N., Berkeley, Calif.

Junior

Cox, Leland G., Norwood, Mass.
Hunt, John, New Haven, Conn.
Utsey, Ashley L., Mullins, S. C.

Student

Turley, Donald G., Columbia, Mo.

Affiliate

Guice, Whit, Jackson, Miss.
Rickey, Roscoe A., Port Orchard, Wash.

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Membership Applications and Advancements

Proposals for admission, advancement, and reinstatement received in the Society office during the month of December are listed below.

Action on the eligibility of those proposed for membership as listed below will be taken by the Council as of February 1960.

Communications from the voting members regarding the membership eligibility of these persons should be received in the Society office prior to that date.

Alaska Section

Junior Grade

Grove, J. D., Dist. Ranger, USFS, Cordova, Alaska (Reinstatement).

Member Grade

Heyn, P. A., Area Forester, Bur. of Land Mgmt., Juneau, Alaska (Junior 1953).

Hoffman, E. J., Forest Eng., USFS, Anchorage, Alaska (Junior 49R56).

Simpson, H. L., Dist. Forest Ranger, USFS, Petersburg, Alaska (Junior 1953).

Tiedemann, R. K., Forester, USFS, Juneau, Alaska (Junior 1953).

Allegheny Section

Student Grade

WEST VIRGINIA UNIVERSITY

Anderson, L. E. Singer, J. R.

Junior Grade

Students Eligible for Automatic Advancement

PENNSYLVANIA STATE UNIVERSITY

Friedrich, R. P. Lyle, R. F.
Harris, B. D. Williams, R. M.

WEST VIRGINIA UNIVERSITY

Bachant, J. P. Mateer, P. R.
Bowman, B. A. McDaniel, J. R.
Bucklew, C. F. Mechem, J.
Carson, W. S. Myers, C. C.
Eye, J. L. Patton, D. R.
Hathaway, J. B. Riley, C. E.
Martin, J. R. Wills, J. C.
Wolf, J. W.

Member Grade

Bowman, R. C., Procurement Mgr., Pat-N-Wood Corp., Oil City, Pa. (Junior 1953).

Detwiler, J. S., Pulpwood Contractor, Johnsonburg, Pa. (Junior 1951).

Kirk, C. R., Unit Conservationist, Soil Cons. Service, Leesport, Pa. (Junior 1951).

Lewis, R. P., Forester, Pa. Dept. of Forests and Waters, Huntingdon, Pa. (Junior 1953).

Longtine, R. C., Forester, Fisher & Young, Inc., Titusville, Pa. State Univ. N. Y., BSF, 1955. (Junior 1955).

Phillips, R. L., Asst. Dist. Ranger, Allegheny Nat'l Forest, Sheffield, Pa. (Junior 1953).

Robinson, G. R., Forester, Pa. Dept. of Forests and Waters, Wellsboro, Pa. (Junior 1953).

Rossman, W. R., Forester,, Pa. Electric Co., Johnstown, Pa. (Junior 50R57).

Sallack, E. L., Forester, Hammermill Paper Co., Warren, Pa. (Junior 1953).

Schrey, F. J., Wood Util. Adviser, Pa. Dept. of Forests and Waters, Harrisburg, Pa. (Junior 1953).

Zarichansky, J., Soil Cons. Service, Brookville, Pa. (Junior 1953).

Appalachian Section

Junior Grade

Clement, J. M., Forest Tech., International Paper Co., Marion, S. C. N. C. State College, BSF, 1954.

Students Eligible for Automatic Advancement

NORTH CAROLINA STATE COLLEGE

Hannah, H. D. Robbins, D. H.
Helms, G. A. Seagle, M. E.
Young, D. G.

Member Grade

Allan, K. M., Milliken Forestry Co., Columbia, S. C. (Junior 1951).

Crutchfield, D. M., Research Forester, W. Va. Pulp & Paper Co., Summerville, S. C. (Junior 1953).

Gibson, M. C., Forest Products Dealer, Cape Fear Wood Corp., Elizabethtown, N. C. (Junior 1953).

Meckert, D. C., Forester, W. Va. Pulp & Paper Co., Georgetown, S. C. (Junior 1953).

Parker, F. C., Dist. Mgr., The Champion Paper & Fibre Co., Edgefield, S. C. (Junior 48R54).

Paschal, W. J., Partner, Paschal Lbr. Co., Lillington, N. C. (Junior 1953).

Sheffer, H. W., Forester, Glatfelter Pulp Wood Co., Fredericksburg, Va. (Junior 1953).

Stokes, J. W., Co. Forester, N. C. Dept of Cons., Albemarle, N. C. (Junior 1953).

Affiliate Grade

Dorr, F. J., Forester, USFS, Buena Vista, Va.

Grushinski, E. T., Forester, USFS, Union, S. C.

Central Rocky Mountain Section

Member Grade

Hendry, L. E., Staff Officer, Blackhills Nat'l Forest, Custer, S. D. (Junior 49R55).

Hessel, A. J., Equipment Mgmt., USFS, Denver, Colo. (Junior 1953).

Lewis, T. E., Dist. Ranger, Roosevelt Nat'l Forest, Fort Collins, Colo. (Junior 1953).

Mack, J., Asst. Ranger, White River Nat'l Forest, Glenwood Springs, Colo. (Junior 1953).

Ott, J. H., Asst. Ranger, San Juan Nat'l Forest, Mancos, Colo. (Junior 1953).

Woodrow, R. E., Asst. Ranger, White River Nat'l Forest, Eagle, Colo. (Junior 1953).

Central States Section

Junior Grade

Students Eligible for Automatic Advancement

PURDUE UNIVERSITY

Coil, J. E. McNabb, R. D.
Woodbury, G. S.

Columbia River Section

Student Grade

OREGON STATE COLLEGE

DeRidder, C. G. Peterson, R. A.
Ilinsky, N. P. Spahr, M.
Pederson, R. E. Sparks, J. G.
Sykes, G. L.

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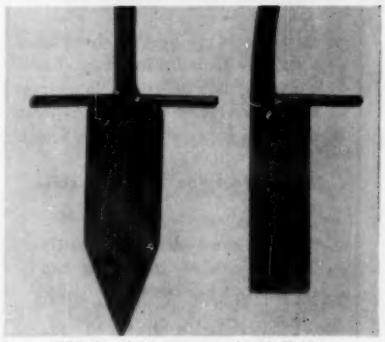

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Junior Grade

Horn, H. E., Logging Eng., Hanel Lbr. Co., Hood River, Ore. Ore. State College, BSF, 1948.

Knepper, R. J., Forester, Mason, Bruce & Girard, Portland, Ore. Colo. State Univ., BSF, 1952.

Orr, W. E., Research Forester, USFS, Portland, Ore. Ore. State College, BSF, 1959.

Rowley, M. L., Partner, Rowley & Parker Tree Farm Service, Philomath, Ore. (Reinstatement).

Schutt, W. W., Sr. Forester, Ore. State Board of Forestry, Salem, Ore. (Reinstatement).

Simonson, J. E., Research Forester, PNW Forest and Rge. Expt. Sta., Portland, Ore. Ore. State College, BSF 1959.

Thurston, J. W., Forester, Bur. of Land Mgmt., Salem, Ore. State Univ. of N. Y., BSF, 1956.

Member Grade

Arrasmith, P. W., Forester, Bur. of Land Mgmt., Roseburg, Ore. (Junior 1953).

Carlson, N. K., Land Mgr., Bishop Estate, Honolulu, Hawaii (Reinstatement).

Kirby, S. P., Forester, USFS, Glide, Ore. (Junior 1953).

Krell, R. K., Forester, USFS, Prospect, Ore. (Junior 50R55).

Leist, E. J., Privately Employed Cruiser, Roseburg, Ore. (Junior 1953).

Lieurance, R. E., Forester, Bur, of Land Mgmt., Roseburg, Ore. (Junior 1953).

Mitchell, R. W., Forester, Bur. of Land Mgmt., Roseburg, Ore. (Junior 50R53).

Schlachter, R. W., Dist. Eng., Bur. of Land Mgmt., Medford, Ore. (Junior 1953).

Schreck, W. R., Forester, USFS, Roseburg, Ore. (Junior 1953).

Sim, J. R., Forester, Bate Lbr. Co., Grants Pass, Ore. (Junior 50R55).

Affiliate Grade

Flye, R. W., Forester, Dept. of Natural Resources, Kelso, Wash.

Gulf States Section

Student Grade

LOUISIANA STATE UNIVERSITY

Johnson, G. A. — Kinsella, N. J.
Weaver, B. D.

Junior Grade

Valentine, G. W., Area Forester, Southland Paper Mills, Inc., Trinity, Texas. (Affiliate 1956).

Students Eligible for Automatic Advancement

LOUISIANA POLYTECHNIC INSTITUTE

Squyres, R. W. — Stroud, R. H.

LOUISIANA STATE UNIVERSITY

Burns, L. V. — Lawton, M. J.
Heard, L. P. — Miranda, W. F.
Kinsley, L. L. — Rumsey, R. L.
LaHaye, H. — Thurman, M. B.
Whatley, L. W.

Member Grade

Baker, R. D., S. F. Austin State College, Nacogdoches, Texas (Junior 51R55).

Bennett, W. H., USFS, New Orleans, La. (Junior 40R54).

Degrummond, E., 727 Carole St., Laurel, Miss. (Junior 1951).

Jewell, F. F., Southern Institute of Forest Genetics, Gulfport, Miss. (Junior 51R55).

Kitt, P. D., 131 Irving St., Lake Charles, La. (Junior 1953).

Mann, D. E., 606 Ave. D, Bogalusa, La. (Junior 50R53).

McDonald, F. O., Good Pine, La. (Junior Af53J53).

McMillan, E. P., 715 Forest Ave., Jackson, Miss. (Junior 1953).

Miesch, J. R., Box 681, Woodville, Texas (Af51J53).

Parsons, G. A., Route 2, Bogue Chitto, Miss. (Junior 1953).

Shain, W. A., Miss. State College, State College, Miss. (Junior 1953).

Turman, R. L., Route 4, Box 59, Franklinton, La. (Junior 1953).

Walters, H. L., Box 33, International Paper Co., Natchitoches, La. (Junior 50R56).

Warriner, W. H., USFS, Jackson, Miss. (Junior 37R55).

White, P. H., 527 Frederick St., Monroe, La. (Junior 1951).

Affiliate Grade

Balmer, W. E., Dist. Ranger, USFS, Wiggins, Miss.

Gillis, J. K., Forester, USFS, Holly Springs, Miss.

Smith, J. L., Unit Forester, International Paper Co., Silsbee, Texas.

Inland Empire Section

Student Grade

UNIVERSITY OF IDAHO

Meisner, G. E. — Pence, D. T.
Ogle, R. A. — Ritchey, N. C.

Intermountain Section

Member Grade

Bonnett, H. W., Dist. Ranger, USFS, McCall, Idaho (Junior 1953).

Hunter, D. B., Industrial Eng., Boise Cascade Corp., Emmett, Idaho (Junior 51R55).

Lancaster, J. W., Dist. Ranger, USFS, McCall, Idaho (Junior 1953).

Ross, C. D., Staff Asst., USFS, Challis, Idaho (Junior 48R55).

Shaw, W. H., Forest Supv., USFS, Salmon, Idaho (Junior 36R55).

Swanson, C. W., Dist. Ranger, USFS, Garden Valley, Idaho (Junior 1953).

Taynton, R., Dist. Ranger, USFS, Tonopah, Nev. (Junior 1953).

Kentucky-Tennessee Section

Member Grade

Birth, E. E., Forester, Payne Baker Estate, Huntsville, Tenn. (Junior 1953).

Gouffon, C. L., Asst. to the Director, Div. of Forestry Relations, Norris, Tenn. (A43J53).

Henson, I. C., Research Analyst, Tenn. Valley Authority, Harriman, Tenn. (Junior 51R55).

Kuester, A. F., Forester, Huber Corp., Crossville, Tenn. (Junior 1953).

Plumb, R. H., Lands Mgmt. Forester, Tenn. Game and Fish Comm., Crossville, Tenn. Purdue Univ., BSF, 1940. (Junior 1954).

Sheldon, N. K., Dist. Ranger, USFS, London, Ky. Univ. of Mass., BSF, 1955. (Junior 1956).

Stanbery, F. W., Tenn. Game & Fish Comm., Nashville, Tenn. (Junior 49R55).

Affiliate Grade

Griffiths, J. R., Forester, USFS, Winchester, Ky.

New England Section

Student Grade

UNIVERSITY OF MAINE

Carter, F. E. Kennedy, R. A.
Hitchcock, R. C. Rooney, F. M.
Thompson, R. O.

Junior Grade
Students Eligible for Automatic Advancement

UNIVERSITY OF MASSACHUSETTS

Brooks, E. R. Foster, T. S.
McFarlin, M. J.

Affiliate Grade

Gilchrist, D. B., Service Forester, Maine Forest Service, Houlton, Maine.

New York Section

Student Grade

STATE UNIVERSITY OF NEW YORK

Carlen, J. G. Nelson, D. H.
Eabry, H. S. Predmore, A. M.
Ferguson, R. C. Reining, R. J.

Northern California Section

Student Grade

UNIVERSITY OF CALIFORNIA

Carville, P. P.

Junior Grade
Students Eligible for Automatic Advancement

UNIVERSITY OF CALIFORNIA

Alford, F. F. Pesonen, D. E.
Hartzell, L. E. Ronald, J. L.

Member Grade

Radel, J. T., Forest Supv., USFS, Bishop, Calif. (Reinstatement).

Affiliate Grade

Armstrong, G. H., Administrative Analyst, Office of the Legislative Analyst, Sacramento, Calif. (Reinstatement).

Northern Rocky Mountain Section

Junior Grade

Chamberlin, J. L., Forester, Yaak Ranger Dist., Troy, Mont. (Reinstatement).
Parker, M. G., Woods Scaler, J. Neils Lumber Co., Rexford, Mont. Mont. State Univ., BSF, 1959.

Students Eligible for Automatic Advancement

MONTANA STATE UNIVERSITY

Greeman, M. G. Saylor, R. J.
Stone, C. O.

Ozark Section

Junior Grade
Students Eligible for Automatic Advancement

UNIVERSITY OF MISSOURI

Grigery, T. E. Schuhmann, M. H.
Hall, R. R. Whitaker, E. C.

Member Grade

Howard, L. R., Asst. Ranger, Crossett Industries, Wilmar, Ark. (Junior 1953).
Hughes, D. C., USFS, Danville, Ark. (Junior 51R57).
McCoy, E. W., Faculty, Ark. A&M College, College Heights, Ark. (Junior 1953).
Samson, D. W., Forestry Consultant, Pomeroy & McGowin, Monticello, Ark. (Junior 1953).
Sharer, D. R., Asst. Ranger, Crossett Industries, Crossett, Ark. (Junior 1953).
Wheeler, R. H., Asst. Ranger, USFS, Heavener, Okla. (Junior 1953).
Wilder, D. L., Inspector, Southwestern Electric, DeQueen, Ark. (Junior 1953).

Affiliate Grade

Cotton, J. W., Tbr. Inspector, Rock Island Railroad, Little Rock, Ark.
Harned, R. C., Box 63, Maramec, Okla.
Leister, R. L., Forest Mgr., Southern Tbr. Co., Inc., Camden, Ark.
Woodson, S. A., Forester, Ark. Game and Fish Comm., DeWitt, Ark.

Associate Grade

Gwinner G. M., Tbr. Farmer, Manchester, Mo.

Puget Sound Section

Student Grade

UNIVERSITY OF WASHINGTON

Furman, L. H.

Junior Grade

Frankenstein, P. O., Forester, Leavenworth Ranger Sta., Leavenworth, Wash. Univ. of Mich., BSF, 1949.
Platz, B. J., Forest Practice Forester, Dept. of Natural Resources, Olympia, Wash. Univ. of Idaho, BSF, 1957.

Students Eligible for Automatic Advancement

UNIVERSITY OF WASHINGTON

Miller, R. E. Saasen, A. L.

Member Grade

Heintz, W. K., Staff Forester, Weyerhaeuser Co., Tacoma, Wash. (Junior 1953).
Holbrook, W. G., Forester, Private Industry, Lake Stevens, Wash. (Junior 48R55).
Hultgren, J., Forester, U. S. Soil Cons. Service, Issaquah, Wash. (Junior 1953).
Kingsley, R. D., Forester, USFS, Bellingham, Wash. (Junior 1953).
Longmoor, J. E., Dist. Ranger, USFS, Twisp, Wash. (Junior 45R55).
Matthias, J. S., Asst. Tax Supv., Rayonier, Inc., Hoquiam, Wash. (Junior 1953).
McAnnich, R. L., Forester, USFS, Everett, Wash. (Junior 1953).
Miner, N. H., Grad. Student, Univ. of Wash., Seattle, Wash. (Junior 1953).
Paine, D. P., Grad. Student, Univ. of Wash., Seattle, Wash. (Junior 1953).
Smith, J. B., Public Info. Rep., Weyerhaeuser Co., Tacoma, Wash. (Junior 1953).
Swanson, K. E., Forester, West Tacoma Newsprint Co., Steilacoom, Wash. (Junior 1953).
Thompson, D. W., Forester, State Dept. of Natural Resources, Sedro Woolley, Wash. (Junior 1953).
Thomson, G. J., Chief Forester, Port Blakely Mill Co., Suquamish, Wash. (Junior 1953).

Southeastern Section

Student Grade

ALABAMA POLYTECHNIC INSTITUTE

Harlan, J. P. Nolen, M. D.
Huffman, J. Oberhausen, J. J.
Langford, G. R. Simms, H. M.
Mason, N. M. Tyson, J.
Nichols, K. C. Williams, B. D.

Junior Grade
Students Eligible for Automatic Advancement

ALABAMA POLYTECHNIC INSTITUTE

Champion, R. H. Harmon, P. F.
Davis, D. M. Lowe, J. R.

UNIVERSITY OF FLORIDA

Daney, B. G. Moody, C. J.
Osterman, W. O.

UNIVERSITY OF GEORGIA

Canada, J. I.

Member Grade

Belcher, H. J., Forester, Rayonier, Inc., Fernandina Beach, Fla. (Junior 1953).
Bree, J. C., Exp. Forester, Owens-Illinois Glass Co., Jacksonville, Fla. (Junior 1953).
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Co., Pensacola, Fla. (Junior 1953).
Haskins, N. H., Forester, St. Regis Paper Co., Pensacola, Fla. (Af51J53).
Johnstono, H. E., Forester, American Tobacco Co., Quincy, Fla. (Junior 1953).
Kelly, T. H., Forester, Scott Paper Co., Century, Fla. (Junior 1953)
Marlow, E. G., Procurement Forester, Koppers Co., Gainesville, Fla. (Junior 1951).
Moore, S. P., Ga. Forestry Comm., Statesboro, Ga. (Junior 52R55).
Read, R. E., Forester, International Paper Co., Starke, Fla. (Junior 1953).
Reeves, J. D., 3009 Garden Lakes Blvd., Rome, Ga. (Junior 1953).
Richey, J. W., Box 563, Milledgeville, Ga. (Junior 1953).
Rowe, R. H., Forester, Madison, Fla. (Junior 1951).
Schultz, W. J., Box 144, Route 3, Washington, Ga. (Junior 1953).
Smith, R. M., Forester, St. Regis Paper Co., Pensacola, Fla. (Junior 1952).
Van Cleave, A. K., Procurement Forester, St. Regis Paper Co., Jacksonville, Fla. (Junior 1953).
Vining, J. C., Forester, Hudson Paper & Pulp Co., Deland, Fla. (Junior 1953).

Southwestern Section

Member Grade

Cochrane, J. S., Dist. Forest Ranger, Coconino Nat'l Forest, Flagstaff, Ariz. (Junior 1953).
D'Amelio, J. F., Dist. Forest Ranger, Carson Nat'l Forest, Farmington, N. Mex. (Junior 1953).
Eslyn, W. E., Plant Pathologist, USFS, Albuquerque, N. Mex. (Junior 1953).
Finley, W. B., Dist. Forest Ranger, Kaibab Nat'l Forest, Fredonia, Ariz. (Junior 1953).
Gallaher, W. B., Dist. Forest Ranger, Coconino Nat'l Forest, Flagstaff, Ariz. (Junior 1951).
Gashwiler, R. N., Forester, USFS, Albuquerque, N. Mex. (Junior 50R53).
Gossard, D. C., Dist. Forest Ranger, Coconino Nat'l Forest, Flagstaff, Ariz. (Junior 1951).
Jones, T. R., Forester, Apache Nat'l Forest, Springerville, Ariz. (Junior 1951).
Lyon, R. E. A., Forester, Bur. of Indian Affairs, Whiteriver, Ariz. (Junior (1951).
Menninghaus, F. F., Dist. Forest Ranger, Prescott Nat'l Forest, Prescott, Ariz. (Junior 1953).
Pinneo, J. E., Forester, Southwest Lbr. Mills, Inc., McNary, Ariz. (Junior 1953).
Reynolds, H. C., Dist. Forest Ranger, Lincoln Nat'l Forest, Cloudcroft, N. Mex. (Junior 1951).
Richardson, F. H., Forester, Coronado Nat'l Forest, Tucson, Ariz. (Junior 1951).
Severtson, H. L., Dist. Forest Ranger, Coconino Nat'l Forest, Winslow, Ariz. (Junior 1953).
Shilling, G. E., Dist. Forest Ranger, Cibola Nat'l Forest, Mountainair, N. Mex. (Junior 1951).
Thorne, J. W., Dist. Forest Ranger, Cibola Nat'l Forest, Magdalena, N. Mex. (Junior 1953).
Worthman, C. D., Forester, Bur. Indian Affairs, Mescalero, N. Mex. (Junior 1953).

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UNIVERSITY OF MINNESOTA

Anderson, K. W. — Packer, D. L.
Becker, G. C. — Prigge, P. E.
Lukes, B. M. — Schloer, W. C.
Maeglin, R. R. — Steiro K. O.
Nickless, H. R. — Swanson, W. A.

Junior Grade

Blyth, J. E., Grad. Asst., Iowa State Univ., Ames, Iowa. (Reinstatement).

Students Eligible for Automatic Advancement

IOWA STATE UNIVERSITY

Arney, R. J. — Johnson, R. C.
Brinck, R. P. — Kaderabek, J. K.
Cochran, P. H. — Keller, D. V.
Duskin, D. L. — Orcutt, D. A.
Fields, B. L. — Sloan, L. J.
Stuelka, D. O.

Member Grade

Bay, R. R., Forester, Lake States Forest Expt. Sta., Grand Rapids, Minn. (Junior 1953).
Ehrlich, G. H., Forester, Minnesota Agency, Bemidji, Minn. (Junior 1953).
Ferguson, D. D., Forester, Superior Nat'l Forest, Two Harbors, Minn. (Junior 1953).
Hamlin, W. W., Forester, Tomahawk Tbr. Co., Ely, Minn. (Junior 1953).
Hanson, W. R., Dist. Forester, Minnesota Div. of Forestry, Brainerd, Minn. (Junior 1953).
Jensen, C. E., Statistician, Central States Forest Expt. Sta., Ames, Iowa (Junior 1953).
Kallio, E., Research Forester, Iron Range Resources Comm., Walker, Minn. (Junior 1953).
Kinney, G. H., Land Commissioner, Crow Wing County, Minn. (Junior 1953).
Mitchell, L. A., Sales Office, Paxton Lbr. Co., Des Moines, Iowa (Junior 1953).
Ringold, S. B., Forester, Diamond-Gardiner Corp., Grand Rapids, Minn. (Junior 1953).
Setzer, T. S., Mgr., Amana Sawmill, Amana, Iowa (Junior 1953).
Stone, R. N., Forester, Lake States Forest Expt. Sta., St. Paul, Minn. (Junior 1953).
Stoppel, D. E., Dist. Forester, Iowa Cons. Comm., Adel, Iowa (Junior 1953).
Von Ohlsen, E. F., Forester, Bur. of Indian Affairs, Bemidji, Minn. (Junior 1953).
Winsness, K. E., Instructor, Minn. Forestry School, St. Paul, Minn. (Junior 1953).

Washington Section

Member Grade

Bevard, G. N., Asst. Chief, Div. of Game Mgmt., Gambrills, Md. (Junior 1953).
Clifford, P. G., Research Analyst, Military Intelligence, Alexandria, Va. (Junior 1952).
Graves, W. L., Mgmt. Analyst, USFS, Hyattsville, Md. (Junior 37R53).
Landis, G. H., Forester, Aero Service Corp., Alexandria, Va. (Junior 1952).
Moore, H. J., Agric. Research Service, USDA, College Park, Md. (Junior 1951).
Rossheim, J. D., Photogrammetrist, USFS, Alexandria, Va. (Junior 1951).
Schwartz, C. M., Consulting Forester, Army Map Service, Silver Spring, Md. (Junior 1951).

Wisconsin-Michigan Section

Student Grade

MICHIGAN COLLEGE OF MINING AND TECHNOLOGY

Battey, L. D. — Nygren, H. T.
Hannahs, L. W. — Piepenbrink, H. H.
Kwiatowski, J. A. — Scott, R. E.
Mosher, E. C. — Wright, C. J.
Ziemer, I. R.

UNIVERSITY OF MICHIGAN

Webb, W. M. — Zingg, J. G.

Junior Grade

Students Eligible for Automatic Advancement

MICHIGAN COLLEGE OF MINING AND TECHNOLOGY

Horak, J. E. — O'Donnell, W. A.

MICHIGAN STATE UNIVERSITY

Hansen, H. T. — Marlowe, D. E.
Harmsen, L. W. — Mittig, W. R.
Herrett, A. R. — Schumann, R. H.
Humphrey, E. G. — Van Eynde, D. F.

UNIVERSITY OF MICHIGAN

Babas, P. A. — Jay, D. M.
Locke, E. N.

Member Grade

Crowther, C. R., Instructor, Mich. College of Mining and Tech., Houghton, Mich. Iowa State Univ., BSF, 1947, MS, 1956 (Junior 47R53).
Easterbrook, A. L., Forester, Vulcan Corp., Donken, Mich. (Junior 1953).
Einspahr, D. W., Institute of Paper Chemistry, Appleton, Wis. (Junior 1951).
Eng, D. W., USFS, Bergland, Mich. (Junior 1953).
Goddard, D. W., 336 East Dahl Street, Rhinelander, Wis. (Junior 1953).
Haertle, L. A., P. O. Box 29, Lancaster, Wis. (Junior 1953).
Haskell, H. H., Forest Products Lab., Madison, Wis. (Junior 1953).
Henley, K. D., 717 Manitow, Manitowoc, Wis. (Junior 1953).
Hubbard, R. G., Wis. Cons. Dept., Wausaukee, Wis. (Junior 1953).
Kozlowski, T. T., Univ. of Wis., Madison, Wis. (Junior 40R58).
Trecker, E. W., 2101 Simpson, Madison, Wis. (Junior 1953).

No Section

Corresponding Grade

Lobit, J. T., Mgr. Empresa Nacional De Celulosas De Pontevedra, Pontevedra, Spain.
Romero, R. A., Chief, Chilean Forest Service, San iago, Chile.

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Forestry Relations Counsel
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Member, Association of Consulting Foresters
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Box 311 Tupper Lake, N. Y

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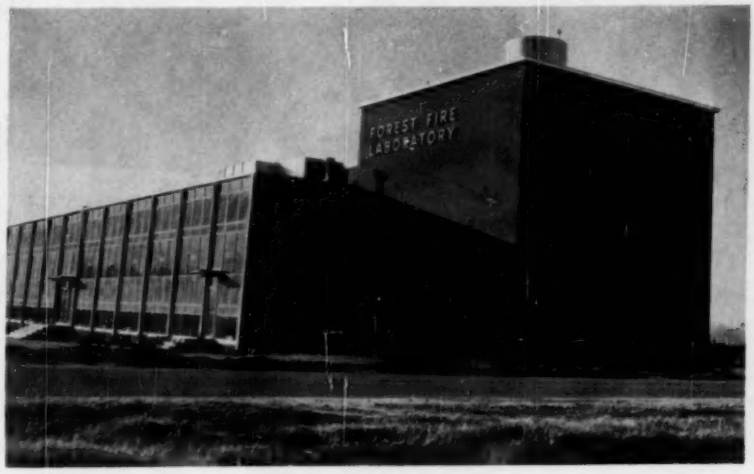

THE NEW Southern Forest Fire Laboratory at Macon, Georgia.

Southern Forest Fire Laboratory Opened

The new Southern Forest Fire Laboratory located at the Georgia Forestry Center near Macon, Ga., was formally opened on November 4, 1959, by Governor Ernest Vandiver.

The building was constructed and furnished by state funds through the Georgia Forestry Research Council at a cost of nearly $400,000. It contains both office space and specialized laboratory facilities, including a wind tunnel, convection room, fluid modeling room, and physical, chemical and photographic laboratories. The Division of Fire Research of the Southeastern Forest Experiment Station, U. S. Forest Service, will conduct the research program. Much of the effort will be devoted to fundamental studies of basic fire phenomena in the field of ignition, combustion, convection, and how fuels respond to the weather. This program is the result of a cooperative agreement between the Forest Service and the Georgia Research Council Forestry Commission.

John W. Langdale served as master of ceremonies. The principal address at the dedication, attended by approximately 500 persons, was delivered by V. L. Harper, assistant chief of the U. S. Forest Service.

An additional fire research laboratory is currently under construction by the Forest Service at Missoula, Mont., while a third is scheduled for California.

Forest Fire Research to Be Expanded

Research on lightning-caused forest fires will be increased through a $63,900 grant to the Forest Service by the National Science Foundation, the U. S. Department of Agriculture announced in December.

Alan T. Waterman, director of the Foundation, approved the grant, effective January 1, 1960, which will expand the research work of Project Skyfire. This is an established Forest Service project to investigate the origin, growth, and behavior of fire-starting lightning storms and possibilities for their control.

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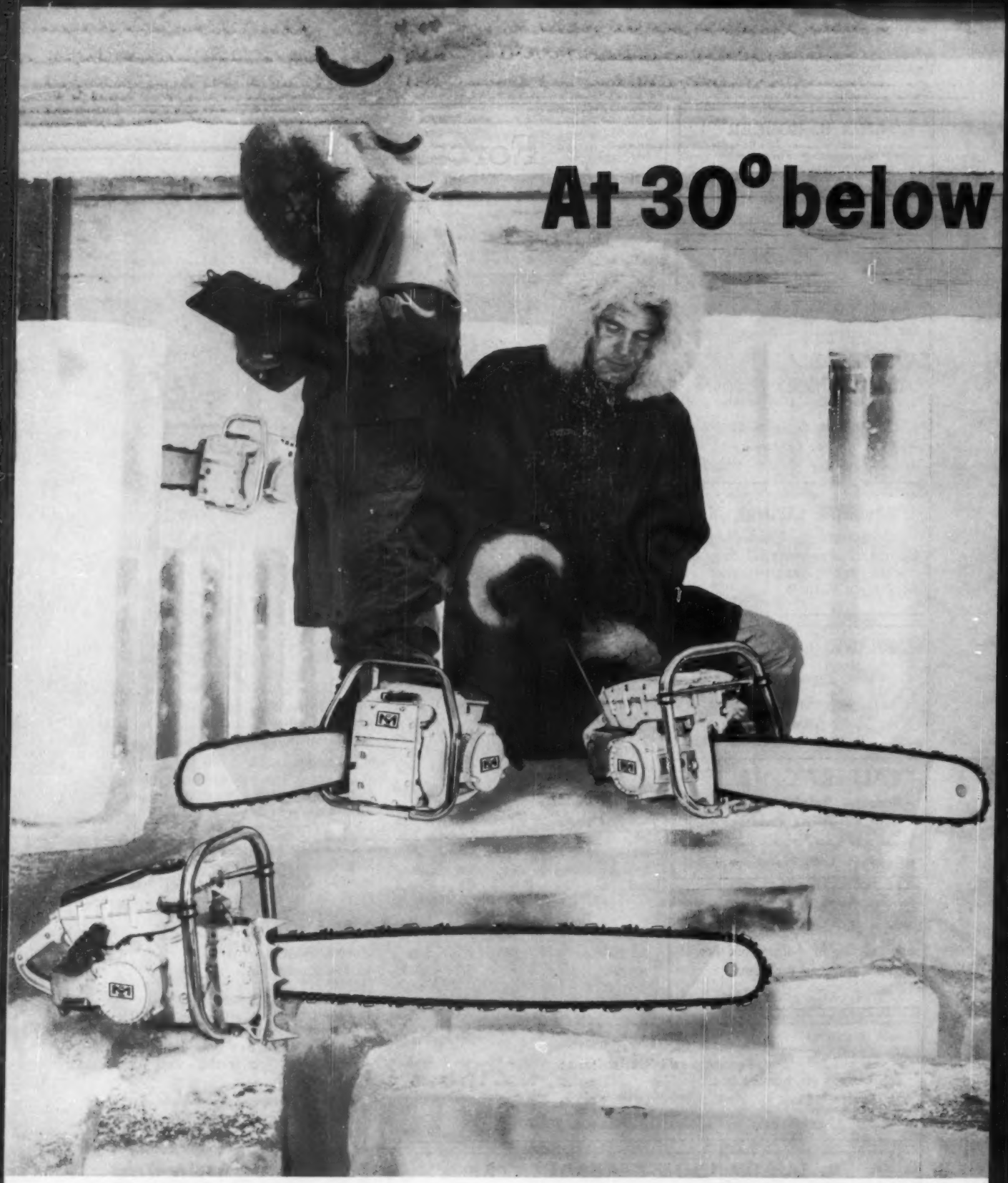

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McCulloch ONE/70 direct-drive chain saw subjected to —30° F. for 40 hours. At completion of impound period, saw tested for starting and wood-cutting performance. No adjustments made.

RESULTS: On first pull of starter rope engine turned easily and smoothly. Second pull produced partial combustion. Third pull resulted in full power start. Saw idled and accelerated smoothly. Subsequent wood-cutting analysis proved torque and RPM excellent.

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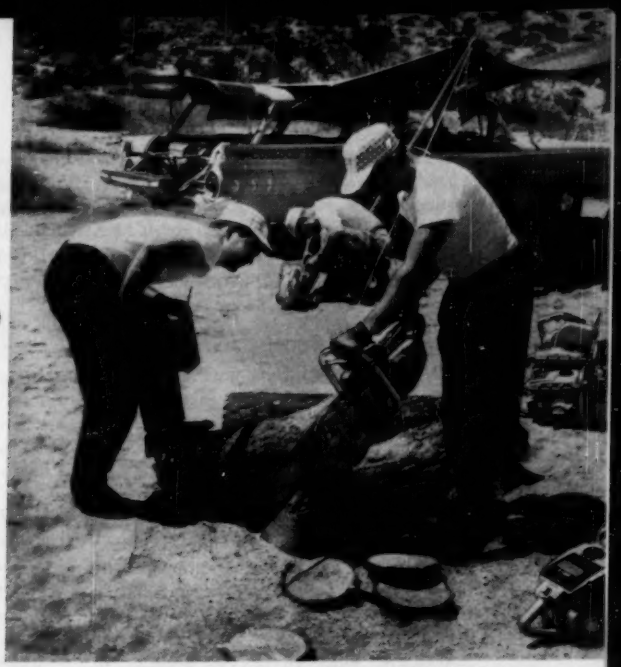

PLACE: Mojave Desert, California. MAX. AIR TEMP: 119.6° F. STARTING: Maximum 3 pulls. MAX. ENGINE TEMP. AT SHUTDOWN: 432.2° F. TYPE OF WOOD CUT: Oak, Fir, Pine, Cedar. PERFORMANCE: Full power. Constant torque transmission to chain.

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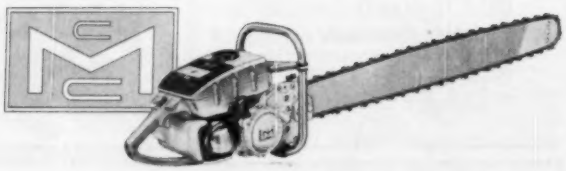

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8-9003

The meteorological research office of the U. S. Weather Bureau has been cooperating in the study and will continue participation in the expanded program.

During the last 20 years more than 125,000 lightning-caused fires have burned in the 13 western States, including Alaska. About 75 percent of all forest fires in the northern Rocky Mountain area, where this research program will be conducted, are started by lightning.

The 2-½ year expanded research program has two specific objectives: (1) To learn the frequency, type, and electrical characteristics of lightning discharges from thunderstorms and evaluate this information in relation to theories of thunderstorms and other atmospheric activity; and (2) To determine what effect the seeding of clouds with silver iodide has on the frequency and electrical characteristics of lightning discharges and to evaluate these results in relation to theories of lightning.

The grant, which is part of the foundation's responsibility in the weather modification program approved by Congress, is one of several made to agencies and universities. The Forest Service program is administered by Reed W. Bailey, Director of the Intermountain Forest and Range Experiment Station at Ogden, Utah. Donald M. Fuquay, Research Meteorologist for the Forest Service at Missoula, Mont. is the project leader.

Three National Forests Established in South, Four Expanded

Three new national forests have been established by Presidential proclamation—the Oconee in Georgia, the Tombigbee in Mississippi, and the Tuskegee in Alabama, the U. S. Department of Agriculture has announced.

The new forests do not add to the acreage in federal ownership. They are land utilization projects on once submarginal lands that have been administered by USDA since their purchase by the former Resettlement Administration in the 1930's for rehabilitation under the Bankhead Jones Farm Tenant Act. The Forest Service has been responsible for their management since 1953.

At the time of the proclamations the President also issued executive orders modifying the boundaries of several southern national forests. One order added four other land utilization projects to existing national forests in Georgia, Louisiana, Mississippi, and Oklahoma. Another order revised the boundaries of several national forests to include in them about 68,000 acres acquired some years ago for national forest purpose and to exclude about 1.3 million acres of privately owned lands which were never purchased.

The 96,000-acre Oconee National Forest in Georgia, named for the river, is the largest of the three new forests. The Tombigbee, which in Choctaw means coffin-makers, contains 65,000 acres in northern Mississippi. The Tuskegee, meaning warriors, is the smallest—10,800 acres.

Forests receiving additional acreage through the transfer of land utilization projects are: "Chattahoochee (Ga.)—11,500 acres, Kisatchie (La.)—31,000 acres, Holly Springs (Miss.)—20,000 acres, and the Ouachita (Okla.)—35,000 acres.

Attendance at the Fifth World Forestry Congress

There seems to be some misunderstanding among United States and Canadian foresters, conservationists and forest industrialists as to who can attend the Fifth World Forestry Congress. Here is the official policy on attendance:

No individual invitation is needed to attend the Fifth World Forestry Congress. The Congress is open to *any private person or technician interested in forestry, forest conservation, forest recreation and the forest industries.* Simply apply for membership on the application form that will be circulated during January-February, 1960, or write to:

Dr. I. T. Haig,
Executive Secretary,
Fifth World Forestry Congress,
Department of State,
Washington 25, D. C.

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People Received More Benefits from National Forests in 1959

The national forests provided more benefits to the American people in 1959 than ever before, the U. S. Department of Agriculture states.

More than $29 million went into public roads and schools in counties containing national forest land in 1959. This represents 25 percent of fiscal year 1959 national forest receipts from timber, grazing, water power, and special land uses. Receipts totaling $124 million were deposited in the general fund of the Federal Treasury.

Besides the money sent to the states for public roads and schools, another 10 percent is earmarked for forest roads and trails in states where forests are located.

The timber harvest of 8.3 billion board feet, another all-time high, provided employment to loggers and mill operators as well as manufacturers of finished wood products.

Ranchers used the national forests to graze approximately 1,067,500 cattle and horses and 2,602,300 sheep. The 61 million acres open to grazing provide summer range for the most part.

More people used the forests for rest and play in 1959. Preliminary reports from Forest Service field offices indicate that recreation visits may hit the 75 million mark as compared to 68 million in 1958.

Some lands were dedicated to special recreation use during the year. The 5,000-acre Great Gulf Wild Area, for instance, was set up in New Hampshire between Mt. Washington and the northern peaks of the Presidential Range. Also during the year hearings were held in Bellingham and Wenatchee, Wash., regarding establishment of the 422,900-acre Glacier Peak Wilderness Area in the North Cascades.

An area dedicated to scientific study and observation is being set up in the sections of the Gallatin and Beaverhead National Forests hit by the earthquake in August. While boundaries of the earthquake geologic area have not been definitely determined, it will include the massive slide which formed a new lake below Hebgen Dam as well as many faults and fissures.

Among significant research developments to protect the benefits that the national forests offer were:

Use of antibiotics in fighting blister rust disease on white pine, introduction of a beetle to fight the woolly aphid epidemic in fir trees; completion of a forest fire laboratory at Macon, Ga., built by the Georgia Forest Research Council and staffed by the Forest Service; and extension of aerial dropping of water as a forest fire fighting technique to the East. This last, effectively used for some years on western fires, has not been used east of the Great Plains until recently.

Consolidation of Nature and and Natural History Magazines Announced

The recent consolidation of two distinguished magazines, *Natural History* published by The American Museum of Natural History in New York, and *Nature Magazine* published in Washington, D. C. by the American Nature Association, has been announced jointly by the trustees of the Museum and the officers of the Association.

The new magazine will be under the direction of John Purcell, editor of *Natural History*, and will be published in New York. Richard W. Westwood, president of the American Nature Association and editor of *Nature Magazine*, will serve as a contributing editor, reporting on developments in the field of conservation as viewed from the nation's capital. Paul Mason Tilden, assistant editor of *Nature Magazine*, will be an associate editor of the combined publication. In addition, several of the departmental editors of *Nature Magazine* will continue to present feature columns at regular intervals.

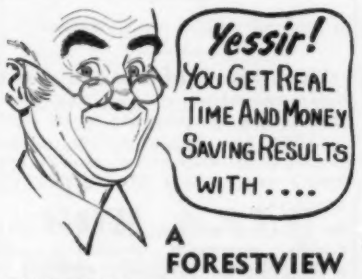
For 36 years and 60 years respectively, *Nature Magazine* and *Natural History* have reported to their readers information in the field of the natural sciences which has not been readily available elsewhere in periodicals. The American Museum of Natural History and the American Nature Association look forward to the consolidation as a means of making still more effective the educational task to which each is dedicated.

Public

Missouri State Forester Named

The Missouri Conservation Commission has announced appointment of Osal B. Capps as state forrester to replace George O. White who retired January 1.

Capps joined the Conservation Com-



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Hawaii

When Captain James Cook landed on the shores of Kauai in 1778, he found a self-sufficient people. Their small, carefully tended paddies of taro plant provided a starch vegetable, and tuberous roots which, when pounded and ground, made a thick paste called poi. Wild fruits from the forest and fish from the sea were abundantly available.

Wood became economically important when islanders learned of the lucrative market in Canton, China for sandalwood, that fragrant wood used in making incense, fans and craftwood items. For forty years, Hawaiian kings exchanged sandalwood profits for items such as looking glasses, steel tools and wooden ships to take the place of their outrigger canoes.

Actual harvesting was done by serfs. Stone axes or adzes were eventually replaced by metal cutting tools which speeded the harvest. A picul, the oriental commercial weight unit which varied from 132 to 143 pounds, was considered a proper amount for a man to carry on his back.

Though harvest methods were crude, they succeeded in removing practically all trees of commercial size. Natural regeneration did not follow and today native sandalwood trees are more of a rarity than reality.

When Captain Vancouver introduced cattle to the islands, King Kamehameha forbid his people to kill them. Rapidly increasing herds over-ran grasslands and forests, the King was forced to lift his "tabu"—and cattle-raising became a business. Only after forests were seriously damaged were pastures fenced to contain roaming cattle, sheep and goats.

During the last 75 years, hundreds of exotic trees were introduced, including about a dozen of commercial varieties. Forestry today is in transition from custodial protection to development under the concept of multiple-use of forest land. Already, the sale of all forest products has risen from less than $50,000 in 1949 to almost $270,000, in 1958—a figure more than five times greater than that sold nine years earlier. Cutting in a random plot of 37 year old Eucalyptus robusta on the island of Hawaii, for instance, yielded 32M ft. BM per acre—produced a single tree 36" DBH, 150' tall and 80' to the nearest branch.

Conceivably, Hawaii's estimated six hundred thousand acres suited to saw timber production could be planted to tree crops, and managed on a rotation of 30 to 35 years, to yield six hundred million feet board measure of valuable hardwoods and softwoods each year.

Hawaii's potential for timber production is enormous.

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mission in 1948 as an assistant district forester and later became district forester for the Gasconade District at Rolla. He remained there until 1956 when he was named to assistant state forester to head fire control activities. On July 1, 1959 he was promoted to associate state forester for all forestry functions.

Capps studied forestry at the University of Missouri and the University of Michigan; he holds a master of forestry degree. He is a member of the Society of American Foresters, and the U. S. Forest Service Region Nine Fire Control Committee. He is currently national secretary-treasurer for the Forestry Conservation Communications Association.

During World War II, Capps spent 31 months in the Southwest Pacific Theatre, primarily in the parachute infantry and is a lieutenant colonel in the Missouri National Guard.

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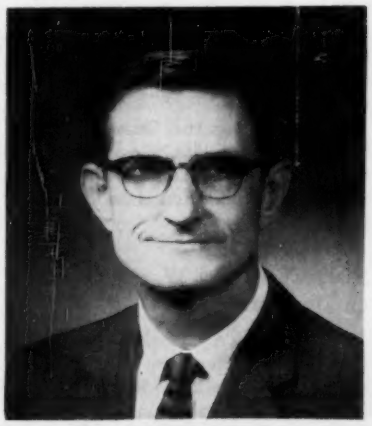
GEORGE O. WHITE

George O. White Retires

Missouri's State Forester George O. White, who announced his retirement effective December 31, 1959, was born December 4, 1894, at Rhinecliff, N. Y. He attended the School of Forestry, University of Michigan and graduated in 1917. In that year he enlisted in the U. S. Army as a private, and was promoted to second lieutenant, 37th Division, as an aerial observer. After World War I he engaged in civil engineering and surveying work for 13 years, after which he accepted a position with the U. S. Forest Service as inspector of work projects for 22 C.C.C. camps on the national forests in Missouri, as well as being in charge of timber management on the Clark National Forest.

In April, 1938, White accepted the responsibility of state forester of Missouri, under the new constitutional amendment that created the Conservation Commission. The growth of Missouri forestry under his guidance is widely appreciated.



OSAL B. CAPPS

As state forester of Missouri, White has gained national recognition both as a forester and administrator. He is past president of the Association of State Foresters, and has served several terms on the executive committee of that organization. He has served two terms as director of the American Forestry Association and one term as vice-president of that group. He has been active in the Ozark Section, Society of American Foresters, and was Section chairman for one term.—*From The Missouri Conservationist.*

Forest Supervisor Named to Washington Staff

Virgil Carrell, supervisor of the San Juan National Forest, with headquarters at Durango, Colo., has been transferred to the Internal Audit Staff in the chief's office of the U. S. Forest Service, Washington, D. C.

Carrell is a graduate of the School

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of Forestry, University of Washington. His assignments with the Forest Service date back to 1931. He has served in many capacities including that of district ranger on several national forests of Washington and Oregon. In 1949 he received special recognition from the Secretary of Agriculture as the outstanding forest ranger of the year. He served on the Regional Office staff in Portland, Ore., from 1952 to 1956, at which time he transferred to the Denver Regional Office as head of the Timber Management Planning Section of the Division of Timber Management.

He was promoted and transferred to supervisor of the San Juan Forest in October 1957.

Forest Service Researcher Takes Foreign Post

Grover A. Choate, employed at the Pacific Northwest Forest and Range Experiment Station, U. S. Forest Service, since 1957, has been named leader of a 5-man American team that will leave in May to work with Cambodian foresters to inventory forest resources and prepare land-use plans for the Indochinese Kingdom during a 2-year International Cooperation Administration assignment. Headquarters for the team will be Phnom Penh, the capital city.

Choate has specialized in forest inventory and photo interpretation work for the last 13 years. From 1946 to 1952 he worked in the Lake States on the nationwide Forest Survey. He was transferred to Washington, D. C., in 1952 and assigned to a special national-defense project involving photo interpretation. In 1957 he moved to the Forest Service's research headquarters in Portland.

Choate has a bachelor of science degree in forestry from the University of Toronto.

Raymond C. Brown Retires

The retirement of Raymond C. Brown, chief of the Division of Forest Insect Research at the U. S. Forest Service's Northeastern Forest Experiment Station, has been announced by Ralph W. Marquis, director. Mr. Brown, who completed his official duties in mid-December, worked 35 years in the federal service.

A native of Lancaster, N. H., he received a B.S. degree with a major in entomology from the University of New Hampshire in 1922. He has since specialized in forest insects and over the years has developed many new techniques in their biological control.

Mr. Brown began his career in 1924 when he went to work for the Bureau of Entomology and Plant Quarantine in Melrose, Mass. Two years later he was sent to Europe to find natural controls for the gypsy moth and other destructive forest pests. For the next four years, through 1930, he traveled extensively throughout central Europe.

He was transferred in 1935 to the Bureau's laboratory in New Haven, Conn., where he assumed the post of station leader of Forest Insect Investigation.

In 1954 after the Bureau of Entomology and Plant Quarantine became a part of the Forest Service, he was named as division chief in Upper Darby.

1,000 Teenagers Worked on Northern Forests

More than a thousand teenagers found employment on national forests in the Northern Region of the U. S. Forest Service during the year just ended, according to Chas. L. Tebbe, regional forester, Missoula, Mont.

An estimated total of 1,007 18- and 19-year olds were employed on forests in Montana, northern Idaho, and northeastern Washington. The young people worked at such jobs as engineering aids, fire control aids, lookouts, laborers, forestry aids, and cooks helpers.

A great deal of the work done by teenagers is seasonal in nature, permitting their employment without interfering with their school work.

B. R. Sen Voted Another Four Years as FAO Director-General

Dr. B. R. Sen has been re-elected for another four years as director-general of the Food and Agriculture Organization by the FAO Tenth Conference meeting in Rome.

Dr. Sen is a national of India and was first elected FAO director-general at a special conference held in September 1956 for the purpose of choosing a successor to Dr. P. V. Cardon (U.S.) who had resigned in March of that year. Dr. Sen took office in No-

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vember 1956. He was Minister at the Embassy of India in Washington, D. C., from 1947 to 1950 and returned as Ambassador in 1951-1952. He was Ambassador to Japan at the time of his appointment to the FAO post.

New Wild Area Established in New Hampshire

More than 5,000 acres of land on the White Mountain National Forest in New Hampshire has been designated as the Great Gulf Wild Area by the Forest Service to perpetuate its use as a primitive recreation site, the U. S. Department of Agriculture announced recently.

One of the most primitive areas on the eastern slopes of the Presidential Range, the Great Gulf forms a glacial valley, 1,100 to 1,600 feet deep, between Mt. Washington and the Northern Peaks.

Forest Service Makes Final Award of Large Arizona Timber Sale

Final award for the sale of 6 million cords of national forest pulp timber in the Southwest, which will mean a new industry for Arizona, was recently announced by the U. S. Department of Agriculture.

The Southwest Lumber Mills, Inc., of Phoenix, Ariz., was awarded the timber, located on the Colorado Plateau of Arizona and New Mexico in the Kaibab, Coconino, Sitgreaves, Apache, Tonto, and Cibola National Forests.

The sale contract extends over a 30-year period. Assured of a long-range supply of raw material, the company is speeding up plans for construction of a paper mill near Snowflake, Ariz. The mill will have a daily capacity of 150 tons of kraft paper or board and 210 tons of newsprint. Employment in the plant at the start of operations in 1963 will be 400 persons, company officials said.

Windbreak Planting Record in North Dakota in 1960

According to Elmer L. Worthington, woodland conservationist in the Soil Conservation Service, Mandan, N. Dak., 2,851 miles of field windbreak plantings were made in North Dakota during 1959, a 125 percent increase over 1958.

He predicts 1960 field belt plantings will be even greater, provided enough planting stock is available.

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Western Forestry & Conservation Assn. Meets

The Golden Anniversary meeting of the Western Forestry & Conservation Association was held in Spokane, Wash., December 9-11, 1959. Some 800 persons from western states, British Columbia, and Alaska were in attendance, including foresters and forest industry representatives.

New officers of the association were elected as follows: president, Hugh J. Hodgins, Crown Zellerbach Canada, Ltd.; vice presidents, Corydon Wagner, St. Regis Paper Co., Tacoma, Wash.; Louis Frandsen, Southern Pacific Co., San Francisco, Calif.; J. M. Brown, Jr., Pack River Lumber Co., Sandpoint, Idaho; O. B. Calvin, Glacier Park Co., Somers, Mont.; Clarence W. Richen, Crown Zellerbach Corp., Portland, Ore.; Robert B. Walkley, Kootenay Forest Products, Ltd.; secretary, George S. Long, Jr., Weyerhaeuser Co., Tacoma, Wash.; treasurer, C. S. Cowan, Seattle, Wash.; assistant secretary, Carl V. Hersey, Portland, Ore.; assistant treasurer, Corrine Woodruff, Portland, Ore.

Crown Zellerbach Announces Promotions

Crown Zellerbach Corporation's Northwest Timber Department recently announced the promotion of V. Y. Davis to the position of superintendent of the Company's Clatsop Tree Farm near Seaside, Ore.

C. W. Richen, manager of Northwest Timber operations, also reported the appointments of R. M. King, contract logging supervisor, Pacific Tree Farm, as assistant superintendent of the Clatsop Tree Farm; and D. E. Landon, cutting crew foreman, Clatsop division, as assistant superintendent, Cathlamet and Pacific Tree Farms with headquarters at Cathlamet, Wash.

Davis is a 1933 University of Washington logging engineering graduate. He joined Crown Zellerbach upon graduation. He was named resident engineer at Clatsop in 1941 and promoted to assistant superintendent in 1959.

King, an Oregon State College School of Forestry graduate, began his Crown Zellerbach career in 1942. He was assigned as contract logging supervisor for the Pacific Tree Farm at Naselle, Wash., in 1955.

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Landon graduated from the University of Washington College of Forestry in 1950. He started with Crown Zellerbach that year and was appointed to the post of cutting crew foreman at the Clatsop division in 1956.

Davis succeeds H. W. Peterson who was recently named assistant logging manager for the company's Northwest Timber headquarters in Portland.

G. Corydon Wagner, Jr., Named BDSA Adviser

G. Corydon Wagner, Jr., of Tacoma, Wash., an executive of the St. Paul-Tacoma Lumber Co., Division of the St. Regis Paper Co., was recently appointed adviser to the director, Forest Products Division, Business and Defense Services Administration, U. S. Department of Commerce.

Mr. Wagner, assistant manager of the plywood department of St. Paul-Tacoma, goes to BDSA under an arrangement by which industry makes available executive personnel for temporary service—usually six months—without compensation from the government. The assignment also will qualify him for membership in the National Defense Executive Reserve which would staff the operation of a production agency in event of national emergency.

An engineering graduate of Yale in 1949, Mr. Wagner has been with St. Paul-Tacoma since except for three years in the Marine Corps during World War II.

Griffee Named Acting WPA Manager

W. E. Griffee was appointed acting secretary-manager of the Western Pine Association effective January 1. He will fill the post vacated by S. V. Fullaway, Jr., who recently retired.

Griffee is a 1924 forestry graduate of Oregon State College. His experience includes work with the U. S. Forest Products Laboratory in Madison, Wis., a member of the National Lumber Manufacturers Association promotion staff, and forest engineering work with the U. S. Forest Service.

He joined Western Pine as Fullaway's assistant in 1934.

TAPPI Meeting to Attract 3000

The 45th Annual Meeting of the Technical Association of the Pulp and Paper Industry will be held in the Hotel Commodore, New York, N. Y., on February 22-25, 1960. Twenty-nine technical sessions, the annual business meeting, and nearly 60 committee meetings highlight the program.

A yearly event, held during the week of Washington's birthday, this meeting is expected to attract 3,000 papermakers and allied industry personnel. Technical sessions will cover topics as diverse as Acid Pulping and Graphic Arts.

F. K. Weyerhaeuser to Retire as Company President

Weyerhaeuser Company has announced changes in its officers effective February 1, 1960. Norton Clapp of Seattle, Wash., Pacific Northwest business leader, has been elected president, succeeding F. K. Weyerhaeuser who will become chairman of the board.

Clapp, chairman of the board since March, 1957, was elected after Weyerhaeuser announced his retirement as president effective February 1.

The Weyerhaeuser elections took place in Tacoma, Wash., November 18 at a meeting of the company's board of directors.

Weyerhaeuser has been president of the company since December, 1956, at which time he succeeded his brother, J. P. Weyerhaeuser, Jr., after the latter's death. F. K. Weyerhaeuser served as chairman of the board from March, 1955, until taking over the presidency in 1956.

Clapp joined Weyerhaeuser's board of directors in 1946. He was named vice president and a member of the board's executive committee in March, 1955.

He is president of Laird, Norton Company, and is a director of the General Insurance Company of Seattle.

F. K. Weyerhaeuser served as president of the company during a period of expansion, highlighted in February, 1957, by the merger with Kieckhefer Container Company and the Eddy Paper Corporation.

He also reorganized the company into three business groups: lumber, plywood and timberland group; pulp, paperboard and container group; research, new products and Silvatek group.

A resident of Tacoma, Weyerhaeuser began his forest products career in 1919 with the Boise-Payette Lumber Company in Idaho. He joined Weyerhaeuser Sales Company as a field representative in 1920. In 1929 he was elected president of the Sales Company.

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Chicago and North Western Appoints Forester

The Chicago and North Western Railway has announced appointment of a full-time forester in the region of South Dakota's Black Hills and western Wyoming.

Lawrence H. Jacobson, former farm forester of the South Dakota Game, Fish and Parks Commission, Spearfish, S. D., has been appointed to the new railway post. Jacobson's headquarters will be at Rapid City.

William A. Kluender, director of agricultural and resource development of the North Western Railway at Chicago, said that Jacobson is the first forester to be employed by any South Dakota or Wyoming railroad to work full-time in developing forest resources in the two states.

A year ago the railway was instrumental in developing the first regular movement of pulpwood from the Black Hills to Wisconsin paper mills. C&NW initiated a "multiple-carload" freight rate which now makes Black Hills pulpwood competitive at Wisconsin mills.

Jacobson will help to expand the pulpwood and timber markets. He will also evaluate the timber potential for existing and new wood-using industries on the North Western Railway, Kluender explained.

Jacobson is a forestry graduate of the Michigan College of Mining and Technology. He is currently secretary treasurer of the Black Hills chapter of the Society of American Foresters and has been active in South Dakota's tree-farm program.

AFPI Names Regional Managers

American Forest Products Industries has announced the promotion of Lovell C. Rawson of Boston to the position of Eastern regional manager.

Rawson, a forestry graduate of the University of Maine, will coordinate AFPI's forestry educational program through the Boston, New York City and Harrisburg, Pa., district offices.

Thomas P. Brogan of Chicago has been promoted to the position of Midwest regional manager.

A graduate of the University of Notre Dame, Brogan will coordinate AFPI's forestry educational program through the Chicago, Cincinnati, Ohio, and Green Bay, Wis., district offices.

New Survey Planned on Recreational Use of Industry Forests

A new survey on recreational use of commercial timberlands will be made in 1960 by American Forest Products Industries.

Casey Westell, Jr., chairman of AFPI's National Wildlife and Recreation Committee and forest and wildlife ecologist for Packaging Corporation of America, Filer City, Mich., said the survey would enable the forest industries to better tell their story that millions of acres of Tree Farm lands are available for hunting, fishing, hiking, picnicking, camping, and other forms of recreation.

AFPI took its first survey three years ago with results indicating that more than 90 percent of the commercial timberland surveyed were open to public recreation of various types.

The 1960 survey, to be conducted by AFPI's 14 district managers, will be completed by the end of the year.

Schools

Fritz Named 1960 Greeley Lecturer

The appointment of Emanuel Fritz as the 1960 Col. Wm. B. Greeley Lecturer in Industrial Forestry has been announced by Dean Gordon D. Marckworth of the University of Washington College of Forestry.

Professor Fritz will present a series of three lectures on the development of industrial forestry in northern California on March 3, 4, and 5, 1960.

Professor Fritz holds a master's degree in Engineering from Cornell University and a master's degree in Forestry from Yale University. He joined the faculty at the University of California in 1919 and served there until his retirement as professor emeritus in 1954.

Since 1954 he has acted as a consultant in lumbering, forestry, and wood technology in California and throughout the West and has been vice president and technical adviser to the Foundation for American Resource Management.

Professor Fritz will be the fourth speaker in the Industrial Forestry Lecture series. In 1957 the first speaker was Axel Brandstrom, a consulting forester, who spoke on the development of industrial forestry in the Pacific Northwest. In 1958 Frank Heyward of the Gaylord Container Corp. of Bogalusa, La., spoke on the development of industrial forestry in the southern states, and in 1959 C. S. Herr, vice president of Brown Company of Berlin, N. H., spoke on the development of industrial forestry in the northeastern states. These lectures are made possible through a grant given to the College of Forestry as a memorial to Col. William B. Greeley by the Industrial Forestry Association.

Purdue Receives Grant for Harvesting Study

The Container Corporation of America has recently made a grant of $7,800 to the Department of Forestry and Conservation at Purdue University for a three-year research project on integrated harvesting of pulpwood and

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sawlogs from farm woodlands. The grant will be used for a graduate assistantship that will be part of a study of pulpwood production in the vicinity of Carthage, Ind., where wood is being substituted for straw as a pulp material.

Announcement of Short Course in Continuous Forest Inventory

A short course on Continuous Forest Inventory, including the use of data processing machines, will be conducted at the University of Massachusetts, Amherst, Mass., March 28-April 1, 1960.

The Division of State and Private Forestry, U. S. Forest Service, Eastern Region, Upper Darby, Pa., is cooperating with the University of Massachusetts, Department of Forestry and Wildlife Management, and the Cooperative Extension Service in sponsoring this course. A short-course certificate will be issued by the University of Massachusetts to those completing the formal training.

Instruction will be furnished by a Forest Service team having wide experience in the setting up and operation of CFI on industrial, state, and federal forest properties throughout the United States and Canada. These instructors are William Barton, Calvin Stott, Lesley Oliphant, and George Semmens of the Forest Service and Morton Nahrwold of IBM.

Geltz to Represent Home Study School in South

The National School of Forestry and Conservation announces the appointment of Professor Charles G. Geltz of the School of Forestry, University of Florida, as its Southern Regional Educational Counselor. In this capacity, Professor Geltz will represent the School throughout the southeastern United States, provide direct counseling service to students enrolled in the home study program and will handle the final field examinations for all students within his region.

The school offers three basic home study courses for non-professional field men in forestry, soil and water conservation, and fish, wildlife and recreational area management. These courses are designed to equip field employees of public and private organizations with a practical working knowledge of field practices for duties under the general supervision of professionally trained men.

Recently, the school has been accredited by the Wisconsin Department of Public Instruction, approved by the National Home Study Council, and is in process of being recognized by the U. S. Civil Service Commission. It maintains an Extension Office to service its students at 2144 P Street, N. W., Washington 7, D. C.

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Box C, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, B.S.F., M.F. Age 32, married. Seven years experience with West Coast industry in forest management, land and timber procurement, contract logging management, road and property surveys, federal timber sales, and familiar with all phases of logging and road construction. Currently resident forester of large tree farm. Desire relocation with progressive organization in West.
Box D, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, B.S.F., in 1953, Purdue Univ., M.S., in Genetics, 1959, Univ. of Wisconsin. Six years of forest tree improvement work as project associate. Twenty months experience as a part time salesman for an educational organization. Desire position with future in industry, possibly sales or tree improvement work, preferably in the Lake States or Northeast.
Box E, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, B.S., M.F., 1956, New York State College of Forestry. Age 34, married, 3 children. Experience: Photo interpretation and mapping, timber inventory planning, cruising, planting and survey work of woodlot owners. Desire position with private industry in the West, Lake States or Eastern United States, with opportunity for advancement.
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